



**CONSTRUCTION SPECIFICATIONS  
SILO 3 PROJECT**

**CONCRETE PACKAGE**

**July 26, 2002**

SUBMITTED TO:  
FLUOR FERNALD, INC.  
CONTRACT NO. DE-AC24-01OH20115  
DOCUMENT NO.: 40430-TS-0004

*LIST ATTACHED - mwh 9/05/02*

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DATE: *9/5/02*

U.S. DEPARTMENT OF ENERGY  
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

PREPARED UNDER CONTRACT NO. DE-AC24-01OH20115  
JACOBS ENGINEERING PROJECT NO. 35H19605

**ORIGINAL**

**INFORMATION  
ONLY**

**000001**

Project No.: 35H19605  
Project: Silo 3

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## SECTION 01330

### SUBMITTAL PROCEDURES

#### PART 1 GENERAL

All submittals shall be processed in accordance with Part 6 and Part 7 of the contract document.

#### 1.1 DEFINITIONS

##### 1.1.1 Submittal

Shop drawings, product data, samples, operation and maintenance data, and administrative submittals presented for review and approval. Contract Clauses "FAR 52.236-21, Specifications and Drawings for Construction," paragraphs (d), (e), and (f) apply to all "submittals."

##### 1.1.2 Types of Submittals

All submittals are classified as indicated in paragraph "Submittal Descriptions (SD)". Submittals also are grouped as follows:

- a. Shop drawings: As used in this section, drawings, schedules, diagrams, and other data prepared specifically for this contract, by contractor or through contractor by way of subcontractor, manufacturer, supplier, distributor, or other lower tier contractor, to illustrate portion of work.
- b. Product data: Preprinted material such as illustrations, standard schedules, performance charts, instructions, brochures, diagrams, manufacturer's descriptive literature, catalog data, and other data to illustrate portion of work, but not prepared exclusively for this contract.
- c. Samples: Physical examples of products, materials, equipment, assemblies, or workmanship that are physically identical to portion of work, illustrating portion of work or establishing standards for evaluating appearance of finished work or both.
- d. Operation and Maintenance (O&M) Data:  
Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.  
The data is required when the item is delivered to the project site.
- e. Administrative submittals: Data presented for review and approval to ensure that administrative requirements of project are adequately met but not to ensure directly that work is in accordance with design concept and in compliance with contract documents.

#### 1.2 SUBMITTAL IDENTIFICATION (SD)

Submittals required are identified by SD numbers and titles as follows:

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SD-01 Reserved

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

Calculations, mix designs, analyses or other data pertaining to a part of work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must have been within three years of date of contract award for the project.)

Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

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Investigation reports

Daily checklists

Final acceptance test and operational test procedure

#### SD-07 Certificates

Statements signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Statement must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

Confined space entry permits.

#### SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and Material Safety Data sheets concerning impedances, hazards and safety precautions.

#### SD-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

Factory test reports.

#### SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

#### SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

##### 1.2.1 Approving Authority

Fluor Fernald, Inc. will approve all submittals.

##### 1.2.2 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

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### 1.3 SUBMITTALS

#### 1.3.1 List of Submittals

A List of Submittals by Specification Section is provided in Exhibit 1 at the end of this Section.

#### 1.3.2 Format for Shop Drawings

SEE ACR-001

#### 1.3.3 Format of Product Data

SEE ACR-001

#### 1.3.4 Format of Samples

SEE ACR-001

#### 1.3.5 Format of Administrative Submittals

SEE ACR-001

### 1.4 QUANTITY OF SUBMITTALS

#### 1.4.1 Number of Copies of Shop Drawings

SEE ACR-001

#### 1.4.2 Number of Copies of Product Data

SEE ACR-001

#### 1.4.3 Number of Samples

SEE ACR-001

#### 1.4.4 Number of Copies of Operation and Maintenance Data

SEE ACR-001

#### 1.4.5 Number of Copies of Administrative Submittals

SEE ACR-001

-- End of Section --

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## SUBMITTAL LIST

TITLE AND LOCATION:  
SILOS 3  
MASTER SUBMITTAL LIST

CONTRACT NO.:  
35H19605  
EXHIBIT 1

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	Notify Fluor Fernald in writing 10 days	
	Prior to the commencement of work.	
02200	SD-06 Test Reports	
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	testing laboratory	
	Documentation of nuclear density guage	
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	As-built topographic drawings	
	Weight slips, manifests	
02215	SD-06 Test Reports	
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	Embedment fill material test results	
	Tests for moisture-density relation Insitu	
	density and moisture test results	
	SD-11 Closeout Submittals	
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02270	SD-03 Product Data	
	Manufacturer's data on silt fence	
	Manufacturer's data on erosion	
	control matting	
	SD-08 Manufacturer's Instructions	
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02510	SD-03 Product Data	
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02722	SD-06 Test Reports	
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05500	SD-02 Shop Drawings	
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15080	SD-03 Product Data	
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15106	SD-01 Preconstruction Submittals	
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15135	SD-01 Preconstruction Submittals	
	Product data and certificates	
	Weld specifications	
	Procedure qualification records	
	Welder certifications	
	Weld inspector qualifications	
	Shop drawings	
	Product data for dissimilar metal isolation kits	
	Pneumatic test procedure	
	Calibration report for test gauges	
	Cleaning procedures	
	Test procedures and schedule	
	Material control procedure	
	Vendor data for all equipment as required in data sheets	
	SD-03 Product Data	
	Piping and fittings materials	
	Joints	
	SD-07 Certificates	
	Piping and fittings materials	
	SD-08 Manufacturer's Instructions	
	Piping and fittings materials	
	SD-11 Closeout Submittals	
	Certified as-built drawings	
	Weld maps	
	Inspections reports	
	Test reports	
	Cleaning reports	
15136	SD-01 Preconstruction Submittals	
	Product data and certificates	
	Weld specifications	
	Procedure qualification records	
	Welder certifications	
	Weld inspector qualifications	
	Shop drawings	
	Product data for dissimilar metal isolation kits	
	Pneumatic test procedure	

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## SUBMITTAL LIST

TITLE AND LOCATION:  
SILOS 3  
MASTER SUBMITTAL LIST

CONTRACT NO.:  
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EXHIBIT 1

15136 (continued)	Calibration report for test gauges	
	Cleaning procedures	
	Test procedures and schedule	
	Material control procedure	
	Vendor data for all equipment as required in data sheets	
	SD-03 Product Data	
	Piping and fittings materials	
	Joints	
	SD-07 Certificates	
	Piping and fittings materials	
	SD-11 Closeout Submittals	
	Certified as-built drawings	
	Weld maps	
	Inspection reports	
	Test reports	
	Cleaning reports	
15262	SD-01 Preconstruction Submittals	
	Shop drawings	
	Material control procedure	
	Vendor data for all products	
	SD-02 Shop Drawings	
	Installation drawings for pipe insulation	
	SD-03 Product Data	
	Submit manufacturer's standard drawings or catalog cuts	
	Adhesives	
	Coatings	
	Insulating cement	
	Insulation materials	
	Jacketing	
	Tape	
	SD-07 Certificates	
	Adhesives	
	Coatings	
	Insulating cement	
	Insulation materials	
	Jacketing	
	Tape	
	SD-08 Manufacturer's Instructions	
	Installation procedures for insulation and accessories	
15270	SD-01 Preconstruction Submittals	
	Shop drawings	
	Material control procedure	
	Vendor data for all products	
	SD-03 Product Data	

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**SUBMITTAL LIST**

TITLE AND LOCATION:  
SILOS 3  
MASTER SUBMITTAL LIST

CONTRACT NO.:  
35H19605  
EXHIBIT 1

15270 (continued)	Submit manufacturer's standard drawings or catalog cuts	
	Adhesives	
	Fasteners	
	Coatings	
	Jacketing	
	Tape	
	SD-07 Certificates	
	Adhesives	
	Fasteners	
	Coatings	
	Jacketing	
	Tape	
	SD-08 Manufacturer's Instructions	
	Installation procedures for jacketing and accessories	
15810	SD-01 Preconstruction Submittals	
	Shop drawings of ductwork, equipment and duct accessories furnished by the Contractor shall be submitted to Fluor Fernald, Inc., for approval before fabrication and erection	
	Submit all data sheets with all information completed by equipment supplier, as requested on individual data sheets	
	Cleaning procedures	
	MSDS's	
	Weld specifications	
	Weld procedure qualification records	
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15895	SD-03 Product Data	
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SECTION 03100

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SECTION 03100

STRUCTURAL CONCRETE FORMWORK

PART 1 GENERAL

1.1 SCOPE

This specification details the formwork requirements for cast-in-place structural concrete for the Process Building and all related, adjoining structures.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 347R (2001) Guide to Formwork for Concrete

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4 (1995) Basic Hardboard

U.S. DEPARTMENT OF COMMERCE (DOC)

DOC PS 1 (1996) Voluntary Product Standard -  
Construction and Industrial Plywood

1.3 SUBMITTALS

Fluor Fernald, Inc., approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Formwork; G

Drawings showing site-specific details of formwork, including dimensions of fiber voids, joints, supports, studding and shoring, and sequence of form and shoring removal.

SD-03 Product Data

Design; G

Design analysis and calculations for form design and methodology used in the design.

Form Materials; G

Manufacturer's data including literature describing form materials,

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accessories, and form releasing agents.

Form Releasing Agents;

Manufacturer's recommendation on method and rate of application of form releasing agents.

#### 1.4 DESIGN

Formwork shall be designed in accordance with methodology of ACI 347R for anticipated loads, lateral pressures, and stresses. Forms shall be capable of producing a surface which meets the requirements of the class of finish specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. Forms shall be capable of withstanding the pressures resulting from placement and vibration of concrete.

#### 1.5 STORAGE AND HANDLING

Forms shall be stored in an organized manner that minimizes rusting and restricts potential for warping.

### PART 2 PRODUCTS

#### 2.1 FORM MATERIALS

##### 2.1.1 Forms For Class A and Class B Finish

Forms for Class A and Class B finished surfaces shall be plywood panels conforming to DOC PS 1, Grade B-B concrete form panels, Class I or II. Other form materials or liners may be used provided the smoothness and appearance of concrete produced will be equivalent to that produced by the plywood concrete form panels.

##### 2.1.2 Forms For Class C Finish

Forms for Class C finished surfaces shall be shiplap lumber; plywood conforming to DOC PS 1, Grade B-B concrete form panels, Class I or II; tempered concrete form hardboard conforming to AHA A135.4; other approved concrete form material; or steel, except that steel lining on wood sheathing shall not be used.

##### 2.1.3 Forms For Class D Finish

Forms for Class D finished surfaces, except where concrete is placed against earth, shall be wood or steel or other approved concrete form material.

##### 2.1.4 Form Ties

Form ties shall be factory-fabricated metal ties, shall be the internal disconnecting or snap-off type, and shall be of a design that will not permit form deflection and will not spall concrete upon removal. Solid backing shall be provided for each tie. Ties shall not leave holes in the concrete surface less than 1/4 inch nor more than 1 inch deep and not more than 1 inch in diameter.

##### 2.1.5 Form Releasing Agents

Form releasing agents shall be commercial formulations that will not bond

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with, stain, or adversely affect concrete surfaces. Agents shall not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Forms shall be mortar tight, properly aligned, and adequately supported to produce concrete surfaces meeting the surface requirements specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE and conforming to construction tolerance given in TABLE 1. Where concrete surfaces are to have a Class A or Class B finish, joints in form panels shall be arranged as approved by Fluor Fernald, Inc. Where forms for continuous surfaces are placed in successive units, the forms shall fit over the completed surface to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall not be reused if there is any evidence of surface wear and tear or defects which would impair the quality of the surface. Surfaces of forms to be reused shall be cleaned of mortar from previous concreting and of all other foreign material before reuse.

#### 3.2 CHAMFERING

Except as otherwise shown, external corners that will be exposed shall be chamfered, beveled, or rounded by moldings placed in the forms. All chamfering shall be 3/4 inch measured on the side unless otherwise noted.

#### 3.3 COATING

Forms for Class A and Class B finished surfaces shall be coated with a form releasing agent before the form or reinforcement is placed in final position. The coating shall be used as recommended in the manufacturer's printed or written instructions. Forms for Class C and D finished surfaces may be wet with water in lieu of coating immediately before placing concrete, except that in cold weather with probable freezing temperatures, coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

#### 3.4 REMOVAL OF FORMS

Forms shall be removed, preventing injury to the concrete and ensuring the complete safety of the structure. Formwork for walls and other parts not supporting the weight of concrete may be removed when the concrete has attained sufficient strength to resist damage from the removal operation but not before at least 24 hours has elapsed since concrete placement. Supporting forms and shores shall not be removed from walls until the structural units are strong enough to carry their own weight and any other construction or natural loads. Supporting forms or shores shall not be removed before the concrete strength has reached 70 percent of design strength, as determined by field cured cylinders or other approved methods.

This strength shall be demonstrated by job-cured test specimens and by a structural analysis considering the proposed loads in relation to these test strengths and the strength of forming and shoring system. The job-cured test specimens for form removal purposes shall be provided in numbers as directed and shall be in addition to those required for concrete quality control. The specimens shall be removed from molds at the age of 24 hours and shall receive, insofar as possible, the same curing and

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protection as the structures they represent.

TABLE 1

TOLERANCES FOR FORMED SURFACES

1. Variations from the plumb:	In any 10 feet of length ----- 1/4 inch
a. In the lines and surfaces of piers, walls and in arises	Maximum for entire length ----- 1 inch
b. For exposed wall corners, control-joint grooves, and other conspicuous lines	In any 20 feet of length ----- 1/4 inch Maximum for entire length----- 1/2 inch
2. Variation from the level or from the grades indicated on the drawings:	In any 10 feet of length -----1/4 inch In any bay or in any 20 feet of length----- 3/8 inch
a. In exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines	In any bay or in any 20 feet of length ----- 1/4 inch Maximum for entire length----- 1/2 inch
3. Variation of the linear building lines from established position in plan	In any 20 feet ----- 1/2 inch Maximum -----1 inch
4. Variation of distance between walls, columns, and partitions	1/4 inch per 10 feet of distance, but not more than 1/2 inch in any one bay, and not more than 1 inch total variation
5. Variation in the sizes and locations of sleeves, and wall openings	Minus ----- 1/4 inch Plus ----- 1/2 inch
6. Variation in the thickness of slabs and walls	Minus ----- 1/4 inch Plus ----- 1/2 inch
7. Footings:	
a. Variation of dimensions in plan	Minus ----- 1/2 inch Plus ----- 2 inches when formed or plus 3 inches when placed against unformed excavation
b. Misplacement of eccentricity	2 percent of the footing width in the direction of misplacement but not more than

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TABLE 1

TOLERANCES FOR FORMED SURFACES

2 inches

c. Reduction in thickness of specified thickness	Minus -----	5 percent up to 1. inch max
8. Variation in steps:	Riser -----	1/8 inch
a. In a flight of stairs	Tread -----	1/4 inch
b. In consecutive steps	Riser -----	1/16 inch
	Tread -----	1/8 inch

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SECTION 03150

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SECTION 03150

EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS

PART 1 GENERAL

1.1 SCOPE

This specification details requirements for expansion joints, contraction joints, and waterstops associated with the construction of the Process Building and all related, adjoining structures. Joint sealants are specified in Section 07900 Joint Sealing.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS  
(AASHTO)

AASHTO T 111 (1983; R 1996) Inorganic Matter or Ash in Bituminous Materials

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4 (1995) Basic Hardboard

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 4 (1986; R 1998) Bitumen Content

ASTM D 6 (1995; R 2000e1) Loss on Heating of Oil and Asphaltic Compounds

ASTM D 1751 (1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

ASTM D 1752 (1984; R 1996e1) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

ASTM D 5249 (2000) Backer Material for Use With Cold and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints

1.3 SUBMITTALS

Fluor Fernald, Inc., approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

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#### SD-02 Shop Drawings

Waterstops; G,

Shop drawings and fabrication drawings provided by the manufacturer or prepared by the Contractor.

#### SD-03 Product Data

Preformed Expansion Joint Filler;  
Waterstops; G,

Manufacturer's literature, including material safety data sheets, for preformed fillers and the lubricants used in their installation; and waterstops.

Manufacturer's recommended instructions for installing preformed fillers, waterstops, and for splicing non-metallic waterstops.

#### SD-07 Certificates

Preformed Expansion Joint Filler;  
Waterstops;

Certificates of compliance stating that the joint filler and waterstops conform to the requirements specified.

### 1.4 DELIVERY AND STORAGE

Material delivered and placed in storage shall be stored off the ground and protected from moisture, dirt, and other contaminants.

## PART 2 PRODUCTS

### 2.1 CONTRACTION JOINT STRIPS

Contraction joint strips shall be 1/8-in.-thick tempered hardboard conforming to AHA A135.4, Class 1. In lieu of hardboard strips, rigid polyvinyl chloride (PVC) or high impact polystyrene (HIPS) insert strips specifically designed to induce controlled cracking in slabs on grade may be used. Such insert strips shall have removable top section.

### 2.2 PREFORMED EXPANSION JOINT FILLER

Expansion joint filler shall be preformed material conforming to ASTM D 1751 or ASTM D 1752. Unless otherwise indicated, filler material shall be 3/8 inch thick and of a width applicable for the joint formed. Backer material, when required, shall conform to ASTM D 5249.

### 2.3 WATERSTOPS

Intersection and change of direction waterstops shall be shop fabricated.

#### 2.3.1 Preformed Plastic Adhesive

Preformed plastic adhesive waterstops shall be produced from blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler and shall contain no solvents, asbestos, irritating fumes, or obnoxious odors. The compound shall not depend on oxidizing,

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evaporating, or chemical action for its adhesive or cohesive strength. The preformed plastic adhesive shall be SynkoFlex or an equal approved by the Contracting Officer.

### 2.3.1.1 Chemical Composition

The chemical composition of the sealing compound shall meet the requirements shown below:

PERCENT BY WEIGHT			
COMPONENT	MIN.	MAX.	TEST
Bitumen (Hydrocarbon plastic)	50	70	ASTM D 4
Inert Mineral Filler	30	50	AASHTO T 111
Volatile Matter		2	ASTM D 6

### 2.3.1.2 Adhesion Under Hydrostatic Pressure

The sealing compound shall not leak at the joints for a period of 24 hours under a vertical 6-ft head pressure. In a separate test, the sealing compound shall not leak under a horizontal pressure of 10 psi, which is reached by slowly applying increments of 2 psi every minute.

### 2.3.1.3 Sag of Flow Resistance

Sagging shall not be detected when tested as follows: Fill a wooden form 1 inch wide and 6 in. long flush with sealing compound and place in an oven at 135 degrees F in a vertical position for 5 days.

### 2.3.1.4 Chemical Resistance

The sealing compound when immersed separately in a 5% solution of caustic potash, a 5% solution of hydrochloric acid, a 5% solution of sulfuric acid, and a saturated hydrogen sulfide solution for 30 days at ambient room temperature shall show no visible deterioration.

## PART 3 EXECUTION

### 3.1 JOINTS

Joints shall be installed at locations as indicated on the drawings or as authorized in writing by the Contracting Officer.

#### 3.1.1 Contraction Joints

Mat foundations and slabs-on-grade greater than 12-in.-thick shall incorporate contraction joints by inserting tempered hardboard strips or rigid PVC or HIPS insert strips into the plastic concrete using a steel parting bar or by securely tying the formwork prior to concrete placement.

In addition to the method described above, slabs-on-grade less than or equal to 12-in.-thick may use contraction joints constructed by cutting the concrete with a saw immediately after concrete has initially set. Joints shall be approximately 1/8 inch wide and shall extend into the slab as noted.

##### 3.1.1.1 Inserting Joint Strips

Strips shall be of the required dimensions as shown on the drawings and as

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long as practicable. After the first floating, the concrete shall be grooved with a tool at the joint locations. The strips shall be inserted in the groove and depressed until the top edge of the vertical surface is flush with the surface of the slab. The slab shall be floated and finished as specified. Working of the concrete adjacent to the joint shall be the minimum necessary to fill voids and consolidate the concrete. Where indicated, the top portion of the strip shall be sawed out after the curing period to form a recess for sealer. The removable section of PVC or HIPS strips shall be discarded and the insert left in place. True alignment of the strips shall be maintained during insertion.

#### 3.1.1.2 Sawed Joints

Joint sawing shall be early enough to prevent uncontrolled cracking in the slab, but late enough that this can be accomplished without appreciable spalling. Concrete sawing machines shall be adequate in number and power, and with sufficient replacement blades to complete the sawing at the required rate. Joints shall be cut to true alignment and shall be cut in sequence of concrete placement. Sludge and cutting debris shall be removed.

#### 3.1.2 Expansion Joints

Preformed expansion joint filler shall be used in expansion and isolation joints between slabs on grade and vertical surfaces where indicated. The filler shall extend the full slab depth, unless otherwise indicated. The edges of the joint shall be neatly finished with an edging tool of 1/8-in. radius, except where a resilient floor surface will be applied. Where the joint is to receive a sealant, the filler strips shall be installed at the proper level below the finished floor with a slightly tapered, dressed, and oiled wood strip temporarily secured to the top to form a recess to the size shown on the drawings. The wood strip shall be removed after the concrete has set. Contractor may opt to use a removable expansion filler cap designed and fabricated for this purpose in lieu of the wood strip. The groove shall be thoroughly cleaned of laitance, curing compound, foreign materials, protrusions of hardened concrete, and any dust which shall be blown out of the groove with oil-free compressed air.

#### 3.1.3 Joint Sealant

Sawed contraction joints and expansion joints in slabs shall be filled with joint sealant, unless otherwise shown. Joint surfaces shall be clean, dry, and free of oil or other foreign material which would adversely affect the bond between sealant and concrete. Joint sealant shall be applied as recommended by the manufacturer of the sealant.

##### 3.1.3.1 Joints With Field-Molded Sealant

Joints shall not be sealed when the sealant material, ambient air, or concrete temperature is less than 40 degrees F. Joints requiring a bond breaker shall be coated with curing compound or with bituminous paint. Bond breaker and back-up material shall be installed where required. Joints shall be primed and filled flush with joint sealant in accordance with the manufacturer's recommendations.

#### 3.2 WATERSTOPS, INSTALLATION AND SPLICES

Waterstops shall be installed at the locations shown to form a continuous water-tight diaphragm. Adequate provision shall be made to thoroughly support and completely protect the waterstops during the progress of the

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work. Any waterstop punctured or damaged shall be repaired or replaced. Exposed waterstops shall be protected during application of form release agents to avoid being coated. Suitable guards shall be provided to protect exposed projecting edges and ends of partially embedded waterstops from damage when concrete placement has been discontinued. Splices shall be made by trained personnel using approved equipment and procedures.

### 3.2.1 Preformed Plastic Adhesive Installation

The installation of preformed plastic adhesive waterstops shall be a prime, peel, place and pour procedure. Joint surfaces shall be clean and dry before priming and just prior to placing the sealing strips. The end of each strip shall be spliced to the next strip with a 1-in. overlap; the overlap shall be pressed firmly to release trapped air. During damp or cold conditions the joint surface shall be flashed with a safe, direct flame to warm and dry the surface adequately; the sealing strips shall be dipped in warm water to soften the material to achieve maximum bond to the concrete surface.

### 3.3 CONSTRUCTION JOINTS

Construction joints are specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE except that construction joints coinciding with expansion and contraction joints shall be treated as expansion or contraction joints as applicable.

-- End of Section --

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## SECTION 03200

### CONCRETE REINFORCEMENT

#### PART 1 GENERAL

##### 1.1 SCOPE

This specification details the requirements for concrete reinforcement, including welded wire fabric, for the Process Building and all related, adjoining structures.

##### 1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

#### AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 318/318R (1999) Building Code Requirements for  
Structural Concrete and Commentary

#### AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 184 (2001) Fabricated Deformed Steel Bar Mats  
for Concrete Reinforcement

ASTM A 185 (2001) Steel Welded Wire Fabric, Plain, for  
Concrete Reinforcement

ASTM A 615 (2001b) Deformed and Plain Billet-Steel  
Bars for Concrete Reinforcement

ASTM A 675 (1990a; R 2000) Steel Bars, Carbon,  
Hot-Wrought, Special Quality, Mechanical  
Properties

#### CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 1MSP (2001) Manual of Standard Practice

##### 1.3 SUBMITTALS

Fluor Fernald, Inc., approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Reinforcement; G

Detail drawings showing job-specific reinforcing steel placement, schedules, sizes, grades, and splicing and bending details. Drawings shall also show support details including types, sizes, and spacing.

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SD-03 Product Data; G

Reinforcing Mechanical Rebar Couplers;

Provide manufacturer's catalog cuts showing embedment requirements and tested pull-out capacity.

SD-07 Certificates

Reinforcing Steel; G

Certified copies of mill reports attesting that the reinforcing steel furnished contains no less than 25 percent recycled scrap steel and meets the requirements specified herein prior to the installation of reinforcing steel.

1.4 DELIVERY AND STORAGE

Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

PART 2 PRODUCTS

2.1 SMOOTH DOWELS

Dowels shall conform to ASTM A 675, Grade 80.

2.2 FABRICATED BAR MATS

Fabricated bar mats shall conform to ASTM A 184.

2.3 REINFORCING STEEL

Reinforcing steel shall be deformed bars conforming to ASTM A 615, grades and sizes as indicated. Where grade is not indicated, provide grade 60.

2.4 WELDED WIRE FABRIC

Welded wire fabric shall conform to ASTM A 185, flat sheets.

2.5 WIRE TIES

Wire ties shall be 16 gauge or heavier black annealed steel wire.

2.6 SUPPORTS

Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI 1MSP and shall be steel or precast concrete blocks. Precast concrete blocks shall have wire ties and shall be not less than 4 inches square when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding concrete. Where concrete formed surfaces will be exposed to weather or where surfaces are to be painted, steel supports within 1/2 inch of concrete surface shall be galvanized, plastic protected, or of stainless steel. Concrete supports used in concrete exposed to view shall have the same color and texture as the finish surface. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of

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plastic.

## 2.7 REINFORCING MECHANICAL REBAR COUPLERS

Reinforcing mechanical rebar couplers shall be forged from ASTM A615 Grade 60 deformed rebar material, free of external welding or machining. It shall be furnished with an integral nailing flange and threaded with UNC or UN thread to a depth equal to 1.0 times the nominal thread diameter plus 1/4 inch. The dowel-in shall be fabricated from ASTM A615 Grade 60 deformed rebar material with thread corresponding to the dowel bar splicer. The completed splice, utilizing the dowel bar splicer and dowel-in, shall meet 150 percent fy exceeding tensile requirements of ACI 318.

## PART 3 EXECUTION

### 3.1 REINFORCEMENT

Reinforcement shall be fabricated to shapes and dimensions shown and shall conform to the requirements of ACI 318/318R. Reinforcement shall be cold bent unless otherwise authorized. Bending shall be performed at the fabricator's shop. Bars shall not be bent after embedment in concrete. Safety caps shall be placed on all exposed ends of vertical and horizontal concrete reinforcement bars that pose a danger to life safety. Wire tie ends shall face away from the forms. Tack welding to or of reinforcement is prohibited. Shearing and bending tolerances and bundling and tagging requirements shall be in accordance with CRSI 1MSP.

#### 3.1.1 Placement

Reinforcement shall be free of loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete. Reinforcement shall be placed in accordance with ACI 318/318R at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as required by ACI 318/318R when not indicated. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits, or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed. Where reinforcing rods are used as supports, use rods no lighter than No. 5 bar.

#### 3.1.2 Splicing

Splices of reinforcement shall conform to ACI 318/318R and shall be made only as required or indicated. Splicing shall be by lapping or by mechanical connection; except that lap splices shall not be used for bars larger than No. 11 unless otherwise indicated. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than one-fifth the required length of lap or 6 inches. Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device.

### 3.2 WELDED-WIRE FABRIC PLACEMENT

Welded-wire fabric shall be placed in slabs as indicated. Fabric placed in slabs on grade shall be continuous between expansion, construction, and contraction joints. Fabric placement at joints shall be as indicated.

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Lap splices shall be made in such a way that the overlapped area equals the distance between the crosswires plus 2 inches. Laps shall be staggered to avoid continuous laps in either direction. Fabric shall be wired or clipped together at laps at intervals not to exceed 4 feet. Fabric shall be positioned by the use of supports.

### 3.3 SMOOTH DOWEL INSTALLATION

Dowels shall be installed in slabs on grade at locations indicated and at right angles to joint being doweled. Dowels shall be accurately positioned and aligned parallel to the finished concrete surface before concrete placement. Dowels shall be rigidly supported during concrete placement. One end of dowels shall be coated with a bond breaker.

-- End of Section --

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SILO 3  
FLUOR FERNALD, INC.  
FERNALD, OHIO  
PROJECT NO.: 35H19605

SECTION NO.: 03300

**SPECIFICATION  
FOR  
CAST-IN-PLACE  
STRUCTURAL CONCRETE**

THIS TITLE SHEET IS THE FIRST PAGE OF THE SPECIFICATION AND A RECORD OF EACH ISSUE OR REVISION. THE PAGES REVISED AND THE DESCRIPTION OF THE REVISION SHOULD BE NOTED UNDER REMARKS.

FOR CONVEINENCE, THE NATURE OF THE REVISION IS BRIEFLY NOTED UNDER REMARKS.

**NOTE: THIS SPECIFICATION WAS CREATED IN SPECSINTACT 3.**

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SECTION 03300

CAST-IN-PLACE STRUCTURAL CONCRETE

PART 1 GENERAL

1.1 SCOPE

This specification details requirements for all cast-in-place structural concrete for the Process Building, including foundation mats, slabs-on-grade, spread footings, concrete walls and columns, elevated slabs, equipment pedestals, and truck unloading areas.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 117/117R	(1990; Errata) Standard Tolerances for Concrete Construction and Materials
ACI 211.1	(1991) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 301	(1999) Standard Specifications for Structural Concrete
ACI 305R	(1999) Hot Weather Concreting
ACI 306R	(1999) Cold Weather Concreting
ACI 318/318R	(1999) Building Code Requirements for Structural Concrete and Commentary

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(1991; R 1996) Burlap Cloth Made From Jute or Kenaf
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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 31	(2000e1) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(2001a) Concrete Aggregates
ASTM C 39	(2001) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 42	(1999) Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

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ASTM C 94	(2002e2) Specification for Ready-Mixed Concrete
ASTM D 75	(1987; R 1997) Sampling Aggregates
ASTM E 96	(2000e1) Water Vapor Transmission of Materials
ASTM C 143	(2000) Slump of Hydraulic Cement Concrete
ASTM C 150	(1999a) Portland Cement
ASTM C 171	(1997a) Sheet Materials for Curing Concrete
ASTM C 172	(1999) Sampling Freshly Mixed Concrete
ASTM C 231	(1997e1) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2001) Air-Entraining Admixtures for Concrete
ASTM C 309	(1998a) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494	(1999ae1) Chemical Admixtures for Concrete
ASTM C 595	(2000a) Blended Hydraulic Cements
ASTM C 618	(2001) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 881	(1999) Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 989	(1999) Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
ASTM C 1017	(1998) Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C 1059	(1999) Latex Agents for Bonding Fresh to Hardened Concrete
ASTM C 1064	(1999) Temperature of Freshly Mixed Portland Cement Concrete
ASTM C 1107	(2002) Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM E 1155	(1996) Determining Floor Flatness and Levelness Using the F-Number System

NATIONAL READY-MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA QC 3	(1984) Quality Control Manual: Section 3, Plant Certifications Checklist:
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# Certification of Ready Mixed Concrete Production Facilities

NRMCA TMMB 100

(1994) Truck Mixer Agitator and Front  
Discharge Concrete Carrier Standards

## U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 400

(1963) Requirements for Water for Use in  
Mixing or Curing Concrete

COE CRD-C 94

(1995) Surface Retarders

### 1.3 SUBMITTALS

Fluor Fernald, Inc., approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

#### SD-03 Product Data

##### Material Safety Data Sheets

##### Mixture Proportions

The results of trial mixture design studies along with a statement giving the maximum nominal coarse aggregate size and the proportions of all ingredients that will be used in the manufacture of concrete at least 10 days prior to commencing concrete placing operations. Aggregate weights shall be based on the saturated surface dry condition. The statement shall be accompanied by test results from an approved independent commercial testing laboratory, showing that mixture design studies have been made with materials proposed for the project and that the proportions selected will produce concrete of the qualities indicated. No substitutions shall be made in the materials or additives used in the mixture design studies without additional tests to show that the quality of the concrete is satisfactory.

In lieu of completing the trial design batches, a previously used design concrete mixture may be presented. The previously designed mixture must be identical to that proposed, and all test records must accompany the mix to establish that the proposed mix meets the design requirements noted above.

Submittal shall include data sheets for items included in the concrete mix, such as cement, pozzolan, fly ash, air-entraining admixture, and any other chemical admixture.

##### Curing Materials

Manufacturer's literature for all curing materials that demonstrates compliance with applicable specifications for the curing materials proposed for the various concrete pours. Include all Material Safety Data Sheets (MSDS) with submittal.

#### SD-06 Test Reports

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#### Field Inspection and Testing Reports

Contractor shall submit a summary of field inspection and testing reports monthly. Reports shall be submitted within 5 days after the end of each monthly reporting period.

#### SD-07 Certificates

##### Qualifications

Written documentation for Contractor Quality Control personnel.

##### Cementitious Materials

Certificates of compliance attesting that the concrete materials meet the requirements of the specifications shall be submitted in accordance with the Special Clause "CERTIFICATES OF COMPLIANCE." Cementitious material will be accepted on the basis of a manufacturer's certificate of compliance.

##### Aggregates

Aggregates will be accepted on the basis of certificates of compliance and tests reports that show the material(s) meet the quality and grading requirements of the specifications under which it is furnished.

#### 1.4 QUALIFICATIONS

Contractor Quality Control personnel assigned to concrete construction shall be American Concrete Institute (ACI) Certified Workers in one of the following grades or shall have written evidence of having completed similar qualification programs:

Concrete Field Testing Technician, Grade II  
Concrete Laboratory Testing Technician, Grade II  
Concrete Construction Inspector, Level II  
Concrete Transportation Construction Inspector or  
Reinforced Concrete Special Inspector, Jointly certified by American Concrete Institute (ACI), Building Official and Code Administrators International (BOCA), International Conference of Building Officials (ICBO), and Southern Building Code Congress International (SBCCI).

In addition, the foreman or lead journeyman of the flatwork finishing crew shall have similar qualification for ACI Concrete Flatwork Technician/Finisher or equal with written documentation.

#### 1.5 GENERAL REQUIREMENTS

##### 1.5.1 Tolerances

Except as otherwise specified herein, tolerances for concrete batching, mixture properties, and construction as well as definition of terms and application practices shall be in accordance with ACI 117/117R. Level and grade tolerance measurements of slabs shall be made as soon as possible after finishing; when forms or shoring are used, the measurements shall be made prior to removal.

##### 1.5.1.1 Floors

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For the purpose of this Section the following terminology correlation between ACI 117/117R and this Section shall apply:

Floor Profile Quality Classification From ACI 117/117R	This Section
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Conventional Bullfloated	Same
Conventional Straightedged	Same
Flat	Float Finish or Trowel Finish

Levelness tolerance shall not apply where design requires floors to be sloped to drains or sloped for other reasons.

#### 1.5.1.2 Floors by the F-Number System

The flatness and levelness of floors shall be carefully controlled. The tolerances shall be measured by the F-Number system of Paragraphs 4.5.6 and 4.5.6.1 of ACI 117/117R. The Contractor shall furnish an approved floor profilograph or other equipment capable of measuring the floor flatness (FF) number and the floor levelness (FL) number in accordance with ASTM E 1155. The Contractor shall perform the tolerance measurements within 72 hours after floor slab construction while being observed by Fluor Fernald, Inc. The tolerances of surfaces beyond the limits of ASTM E 1155 (the areas within 24 inches of embedments and construction joints) shall be acceptable to Fluor Fernald, Inc. Tolerances shall meet the requirements for the listed surfaces as noted on the drawings as specified in paragraphs 4.5.6 and 4.5.6.1 of ACI 117/117R.

#### 1.5.2 Strength Requirements and Water/Cement Ratio

##### 1.5.2.1 Strength Requirements

Specified compressive strength ( $f'c$ ) shall be as noted on drawings.

Compressive strength shall be determined in accordance with ASTM C 39.

- a. Evaluation of Concrete Compressive Strength. Compressive strength specimens (6- by 12-inch cylinders) shall be fabricated by the Contractor and laboratory cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39. The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equals or exceeds the specified compressive strength  $f'c$  and no individual test result falls below the specified strength  $f'c$  by more than 500 psi. A "test" is defined as the average of two companion cylinders, or if only one cylinder is tested, the results of the single cylinder test. Additional analysis or testing, including taking cores and/or load tests, may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient.
- b. Investigation of Low-Strength Compressive Test Results. When any strength test of standard-cured test cylinders falls below the specified strength requirement by more than 500 psi or if tests of field-cured cylinders indicate deficiencies in protection and curing, steps shall be taken to ensure that the load-carrying

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capacity of the structure is not jeopardized. When the strength of concrete in place is considered potentially deficient, cores shall be obtained and tested in accordance with ASTM C 42. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores will be determined by Fluor Fernald, Inc. to least impair the strength of the structure. Concrete in the area represented by the core testing will be considered adequate if the average strength of the cores is equal to at least 85 percent of the specified strength requirement and if no single core is less than 75 percent of the specified strength requirement. Non-destructive tests (tests other than test cylinders or cores) shall not be used as a basis for acceptance or rejection. The Contractor shall perform the coring and repair the holes at his own expense. All core testing shall be conducted by a certified testing agency approved by Fluor Fernald, Inc. Testing will be at the expense of the Contractor.

- c. Load Tests. If the core tests are inconclusive or impractical to obtain or if structural analysis does not confirm the safety of the structure, load tests may be directed by Fluor Fernald, Inc. in accordance with the requirements of ACI 318/318R. Concrete work evaluated by structural analysis or by results of a load test and determined to be understrength shall be corrected in a manner satisfactory to Fluor Fernald, Inc. All investigations, studies, testing, load tests, and correction of deficiencies shall be performed by and at the expense of the Contractor and must be approved by Fluor Fernald, Inc.

#### 1.5.2.2 Water-Cement Ratio

Maximum water-cement ratio (w/c) for normal weight concrete shall be as follows:

WATER-CEMENT RATIO, BY WEIGHT	STRUCTURE OR PORTION OF STRUCTURE
0.40	Slabs Thicker than 2 feet
0.45	All Other Concrete

These w/c's may cause higher strengths than that required above for compressive strength. The maximum w/c required will be the equivalent w/c as determined by conversion from the weight ratio of water to cement plus pozzolan or ground granulated blast furnace slag (GGBF slag) by the weight equivalency method as described in ACI 211.1. In the case where GGBF slag is used, the weight of the GGBF slag shall be included in the equations of ACI 211.1 for the term P, which is used to denote the weight of pozzolan.

#### 1.5.3 Air Entrainment

Concrete specified with a trowel finish an interior concrete shall not be air entrained.

All other exterior normal weight concrete shall be air entrained to contain between 4 and 7 percent total air, except that when the nominal maximum size coarse aggregate is 3/4 in. or smaller it shall be between 4.5 and 7.5 percent. Specified air content shall be attained at point of placement into the forms. Air content for normal weight concrete shall be determined in accordance with ASTM C 231.

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#### 1.5.4 Slump

Slump of the concrete, as delivered to the point of placement into the forms, shall be within the following limits. Slump shall be determined in accordance with ASTM C 143.

Structural Element	Slump	
	Minimum	Maximum
Walls, columns, and beams	2 in.	4 in.
Foundation walls, substructure walls, footings, and slabs	1 in.	3 in.
Any structural concrete approved for placement by pumping:		
At pump	2 in.	6 in.
At discharge of line	1 in.	4 in.

When use of a plasticizing admixture conforming to ASTM C 1017 or when a Type A or F water reducing admixture conforming to ASTM C 494 is permitted to increase the slump of concrete, concrete shall have a slump of 2 to 4 inches before the admixture is added and a maximum slump of 8 inches at the point of delivery after the admixture is added.

#### 1.5.5 Concrete Temperature

The temperature of the concrete as delivered shall not exceed 75 degrees F for slabs thicker than 2 feet nor 90 degrees F for all other concrete. When the ambient temperature during placing is 40 degrees F or less, or is expected to be at any time within 6 hours after placing, the temperature of the concrete as delivered shall be between 55 and 75 degrees F.

#### 1.5.6 Size of Coarse Aggregate

The largest feasible nominal maximum size aggregate (NMSA) specified in paragraph AGGREGATES shall be used in each placement. However, nominal maximum size of aggregate shall not exceed any of the following: three-fourths of the minimum cover for reinforcing bars, three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

#### 1.5.7 Special Properties and Products

Concrete may contain admixtures other than air entraining agents, such as water reducers, plasticizers, or set retarding agents to provide special properties to the concrete, if specified or approved. Any of these materials to be used on the project shall be used in the trial mix designs submitted for approval.

#### 1.6 MIXTURE PROPORTIONS

Concrete shall be composed of portland cement, other cementitious and pozzolanic materials as specified, aggregates, water, and admixtures as specified.

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Concrete mixture proportions shall be the responsibility of the Contractor and shall be in accordance with ACI 211.1. Mixture proportions shall include the dry weights of cementitious material(s); the nominal maximum size of the coarse aggregate; the specific gravities, absorptions, and saturated surface-dry weights of fine and coarse aggregates; the quantities, types, and names of admixtures; and quantity of water per cubic yard of concrete. All materials included in the mixture proportions shall be of the same type and from the same source as will be used on the project.

Documentation that the proposed concrete proportions will produce an average strength equal to or greater than the required average strength  $F_{cr}$  shall consist of the strength test record, or several strength test records from field tests, or shall consist of results from suitable trial mixtures in accordance with ACI 301.

Proposed concrete proportions shall be subject to acceptance by Fluor Fernald, Inc., based on demonstrated ability to produce concrete meeting all requirements of the specification.

#### 1.7 INSPECTION AND TESTING

Day-to-day inspection and testing shall be the responsibility of the Contractor. However, representatives of Fluor Fernald, Inc. can and will inspect construction as considered appropriate and will monitor operations of the Contractor. Fluor Fernald, Inc., inspection or testing will not relieve the Contractor of any of his responsibilities.

##### 1.7.1 Materials

Fluor Fernald, Inc., may sample and test aggregates, cementitious materials, other materials, and concrete to determine compliance with the specifications as considered appropriate. The Contractor shall provide facilities and labor as may be necessary for procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with ASTM D 75. Other materials will be sampled from storage at the jobsite or from other locations as considered appropriate. Samples may be placed in storage for later testing when appropriate.

##### 1.7.2 Fresh Concrete

Fresh concrete will be sampled as delivered in accordance with ASTM C 172 and tested in accordance with these specifications, as considered necessary.

##### 1.7.3 Hardened Concrete

Tests on hardened concrete will be performed by the Contractor when such tests are considered necessary.

##### 1.7.4 Inspection

Concrete operations may be tested and inspected at the request of Fluor Fernald, Inc., as the project progresses. Failure to detect defective work or material will not prevent rejection later when a defect is discovered nor will it obligate Fluor Fernald, Inc., for final acceptance.

#### PART 2 PRODUCTS

## 2.1 CEMENTITIOUS MATERIALS

Cementitious materials shall be portland cement, portland-pozzolan cement, or portland cement in combination with pozzolan or ground granulated blast furnace slag and shall conform to appropriate specifications listed below. Use of cementitious materials in concrete which will have surfaces exposed in the completed structure shall be restricted so there is no change in color, source, or type of cementitious material.

### 2.1.1 Portland Cement

ASTM C 150, Type I or IA with a maximum 15 percent amount of tricalcium aluminate, or Type II or IIA (low alkali).

### 2.1.2 Blended Cements

ASTM C 595, Type IP.

### 2.1.3 Pozzolan (Fly Ash)

ASTM C 618, Class C or F with the optional requirements for multiple factor, drying shrinkage, and uniformity from Table 2A of ASTM C 618. Requirement for maximum alkalis from Table 1A of ASTM C 618 shall apply. If pozzolan is used, it shall never be less than 15 percent nor more than 35 percent by weight of the total cementitious material.

### 2.1.4 Ground Granulated Blast-Furnace (GGBF) Slag

ASTM C 989, Grade 120.

## 2.2 AGGREGATES

Aggregates shall conform to the following.

### 2.2.1 Fine Aggregate

Fine aggregate shall conform to the quality and gradation requirements of ASTM C 33.

### 2.2.2 Coarse Aggregate

Coarse aggregate shall conform to ASTM C 33, minimum size designation 57 for all concrete placement 9 inches and greater.

## 2.3 CHEMICAL ADMIXTURES

Chemical admixtures, when required or permitted, shall conform to the appropriate specification listed. Admixtures shall be furnished in liquid form and of suitable concentration for easy, accurate control of dispensing.

### 2.3.1 Air-Entraining Admixture

ASTM C 260 and shall consistently entrain the air content in the specified ranges under field conditions.

### 2.3.2 Accelerating Admixture

ASTM C 494, Type C or E, except that calcium chloride or admixtures containing calcium chloride shall not be used.

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### 2.3.3 Water-Reducing or Retarding Admixture

ASTM C 494, Type A, B, or D, except that the 6-month and 1-year compressive and flexural strength tests are waived.

### 2.3.4 Mid-Range Water Reducer

ASTM C 494, Type A or F, except that the 6-month and 1-year strength requirements are waived. The admixture shall be used only when approved in writing, such approval being contingent upon approval of the mixture proportions submittal.

### 2.3.5 Surface Retarder

COE CRD-C 94.

### 2.3.6 Other Chemical Admixtures

Chemical admixtures for use in producing flowing concrete shall comply with ASTM C 1017, Type I or II. These admixtures shall be used only when approved in writing, such approval being contingent upon approval of the mixture proportions submittal.

## 2.4 CURING MATERIALS

### 2.4.1 Impervious-Sheet Materials

Impervious-sheet materials shall conform to ASTM C 171, type optional, except that polyethylene sheet shall not be used.

### 2.4.2 Membrane-Forming Compound

Membrane-forming curing compound shall conform to ASTM C 309, Type 1-D or 2, except that only a styrene acrylate or chlorinated rubber compound meeting Class B requirements shall be used for surfaces that are to be painted or are to receive bituminous roofing, or waterproofing, or floors that are to receive adhesive applications of resilient flooring. The curing compound selected shall be compatible with any subsequent paint, roofing, waterproofing, or flooring specified. Nonpigmented compound shall contain a fugitive dye and shall have the reflective requirements in ASTM C 309 waived.

### 2.4.3 Burlap and Cotton Mat

Burlap and cotton mat used for curing shall conform to AASHTO M 182.

## 2.5 WATER

Water for mixing and curing shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that non-potable water may be used if it meets the requirements of COE CRD-C 400.

## 2.6 NONSHRINK GROUT

Nonshrink grout shall conform to ASTM C 1107, Grade A, B, or C, and shall be a commercial formulation suitable for the proposed application.

## 2.7 LATEX BONDING AGENT

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Latex agents for bonding fresh to hardened concrete shall conform to ASTM C 1059.

## 2.8 EPOXY RESIN

Epoxy resins for use in repairs shall conform to ASTM C 881, Type V, Grade 2. Class as appropriate to the existing ambient and surface temperatures.

## 2.9 JOINT MATERIALS

### 2.9.1 Joint Fillers, Sealers, and Waterstops

Materials for waterstops and joints shall be in accordance with Section 03150 EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS.

## 2.10 VAPOR BARRIER

Vapor barrier shall be polyethylene sheeting with a minimum thickness of 10 mils or other equivalent material having a vapor permeance rating not exceeding 0.5 perms as determined in accordance with ASTM E 96.

# PART 3 EXECUTION

## 3.1 PREPARATION FOR PLACING

Before commencing concrete placement, the following shall be performed. Surfaces to receive concrete shall be clean and free from frost, ice, mud, and water. Forms shall be in place, cleaned, coated, and adequately supported in accordance with Section 03100 STRUCTURAL CONCRETE FORMWORK. Reinforcing steel shall be in place, cleaned, tied, and adequately supported in accordance with Section 03200 CONCRETE REINFORCEMENT. Other embedded items shall be in place, clean, tied, and adequately supported. No embedded items will be allowed to be placed into the concrete once concrete placement operations begin. Transporting and conveying equipment shall be in-place, ready for use, clean, and free of hardened concrete and foreign material. Equipment for consolidating concrete, including all spare equipment, shall be at the placing site and in proper working order. Equipment and material for curing and for protecting concrete from weather or mechanical damage shall be at the placing site, in proper working condition, and in sufficient amount for the entire placement. When hot, windy conditions during concreting appear probable, equipment and material shall be at the placing site to provide windbreaks, shading, fogging, or other action to prevent plastic shrinkage cracking or other damaging drying of the concrete.

### 3.1.1 Foundations

#### 3.1.1.1 Concrete on Earth Foundations

Earth (subgrade, base, or subbase courses) surfaces upon which concrete is to be placed shall be clean, damp, and free from debris, frost, ice, and standing or running water. Prior to placement of concrete, the foundation shall be well drained and shall be satisfactorily graded and uniformly compacted. Foundations shall be inspected by the Geotechnical Engineer prior to the placement of any formwork or concrete.

#### 3.1.1.2 Excavated Surfaces in Lieu of Forms

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Concrete for footings may be placed directly against the soil provided the earth has been carefully trimmed, is uniform and stable, and meets the compaction requirements of Section 02215 EXCAVATION, FILLING, AND BACKFILLING FOR BUILDINGS. The concrete shall be placed without becoming contaminated by loose material, and the outline of the concrete shall be within the specified tolerances.

### 3.1.2 Previously Placed Concrete

Concrete surfaces to which additional concrete is to be bonded (including all construction joints) shall be prepared for receiving the next horizontal lift by cleaning the construction joint surface with either air-water cutting, high-pressure water jet, or other approved method. Concrete at the side of vertical construction joints shall be roughened using either air-water cutting, high-pressure water jet, bush hammer, or other approved method, unless otherwise noted. Air-water cutting shall not be used on formed surfaces or surfaces congested with reinforcing steel. Regardless of the method used, the resulting surfaces shall be free from all laitance and inferior concrete so that clean surfaces of well bonded coarse aggregate are exposed and make up at least 10 percent of the surface area, distributed uniformly throughout the surface. The edges of the coarse aggregate shall not be undercut. The surface of horizontal construction joints shall be kept continuously wet for the first 12 hours during the 24-hour period prior to placing fresh concrete. The surface shall be washed completely clean as the last operation prior to placing the next lift.

#### 3.1.2.1 Air-Water Cutting

Air-water cutting of a fresh concrete surface shall be performed at the proper time and only on horizontal construction joints. The air pressure used in the jet shall be 100 psi, plus or minus 10 psi, and the water pressure shall be just sufficient to bring the water into effective influence of the air pressure. When approved by Fluor Fernald, Inc., a surface retarder complying with the requirements of COE CRD-C 94 may be applied to the surface of the lift to prolong the period of time during which air-water cutting is effective. After cutting, the surface shall be washed and rinsed as long as there is any trace of cloudiness of the wash water. Where necessary to remove accumulated laitance, coatings, stains, debris, and other foreign material, high-pressure water jet or sandblasting shall be used as the last operation before placing the next lift.

#### 3.1.2.2 High-Pressure Water Jet

A stream of water under a pressure of not less than 3,000 psi shall be used for cutting and cleaning. Its use shall be delayed until the concrete is sufficiently hard so that only the surface skin or mortar is removed and there is no undercutting of coarse-aggregate particles.

#### 3.1.2.3 Waste Disposal

The method used in disposing of waste water employed in cutting, washing, and rinsing of concrete surfaces shall be such that the waste water does not stain, discolor, or affect exposed surfaces of the structures, or damage the environment of the project area. The method of disposal shall be subject to approval and shall be included in the Contractor's Placement Plan.

#### 3.1.3 Vapor Barrier

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Where required, a vapor barrier shall be provided beneath the interior on grade concrete floor slabs as noted on the drawings. The greatest widths and lengths practicable shall be used to eliminate joints wherever possible. Joints shall be lapped a minimum of 12 inches. Torn, punctured, or damaged vapor barrier material shall be removed, and new vapor barrier shall be provided prior to placing concrete. For minor repairs, patches may be made using laps of at least 12 inches. Lapped joints shall be sealed and edges patched with pressure sensitive adhesive or tape not less than 2 inches wide and compatible with the membrane. Vapor barrier shall be placed directly on underlying subgrade, base course, or capillary water barrier, unless it consists of crushed material or large granular material which could puncture the vapor barrier. In this case, the surface shall be choked with a light layer of sand, as approved, before placing the vapor barrier. A 2-inch layer of compacted, clean concrete sand (fine aggregate) shall be placed on top of the vapor barrier before placing concrete. Concrete placement shall be controlled to prevent damage to the vapor barrier or any covering sand.

#### 3.1.4 Embedded Items

Before placement of concrete, care shall be taken to determine that all embedded items are firmly and securely fastened in place as indicated on the drawings, or as required. Conduit, grounding grid, and other embedded items shall be clean and free of oil and other foreign matter such as loose coatings or rust, paint, and scale. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into voids. Welding shall not be performed on embedded metals within 1 foot of the surface of the concrete. Tack welding shall not be performed on or to embedded items.

### 3.2 CONCRETE PRODUCTION

#### 3.2.1 Batching, Mixing, and Transporting Concrete

Concrete shall be furnished from a ready-mixed concrete plant. Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C 94, except as otherwise specified. Truck mixers, agitators, and nonagitator transporting units shall comply with NRMCA TMMB 100. Ready-mix plant equipment and facilities shall be certified in accordance with NRMCA QC 3. Approved batch tickets shall be furnished for each load of ready-mixed concrete.

#### 3.3 TRANSPORTING CONCRETE TO PROJECT SITE

Concrete shall be transported to the placing site in truck mixers, agitators, or nonagitator transporting equipment conforming to NRMCA TMMB 100 or by approved pumping equipment or conveyors.

#### 3.4 CONVEYING CONCRETE ON SITE

Concrete shall be conveyed from mixer or transporting unit to forms as rapidly as possible and within the time interval specified by methods which will prevent segregation or loss of ingredients using the following equipment. Conveying equipment shall be cleaned before each placement.

#### 3.5 PLACING CONCRETE

Mixed concrete shall be discharged within 1 1/2 hours or before the mixer

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drum has revolved 300 revolutions, whichever comes first after the introduction of the mixing water to the cement and aggregates. When the concrete temperature exceeds 85 degrees F, the time shall be reduced to 45 minutes. Concrete shall be placed within 15 minutes after it has been discharged from the transporting unit. Concrete shall be handled from mixer or transporting unit to forms in a continuous manner until the approved unit of operation is completed. Adequate scaffolding, ramps, additional reinforcing, and/or walkways shall be provided so that personnel and equipment are properly supported. Placing will not be permitted when the sun, heat, wind, or limitations of facilities furnished by the Contractor prevent proper consolidation, finishing, and curing. Sufficient placing capacity shall be provided so that concrete can be kept free of cold joints.

### 3.5.1 Depositing Concrete

Concrete shall be deposited as close as possible to its final position in the forms, and there shall be no vertical drop greater than 5 feet except where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it will be effectively consolidated in horizontal layers not more than 12 inches thick, except that all slabs shall be placed in a single layer. Concrete to receive other construction shall be screeded to the proper level. Concrete shall be deposited continuously in one layer or in layers so that fresh concrete is deposited on in-place concrete that is still plastic. Fresh concrete shall not be deposited on concrete that has hardened sufficiently to cause formation of seams or planes of weakness within the section. Concrete that has surface dried, partially hardened, or contains foreign material shall not be used. When temporary spreaders are used in the forms, the spreaders shall be removed as their service becomes unnecessary. Concrete shall not be placed in slabs over columns and walls until concrete in columns and walls has been in-place at least two hours or until the concrete begins to lose its plasticity. Concrete for beams, girders, brackets, column capitals, haunches, and drop panels shall be placed at the same time as concrete for adjoining slabs.

### 3.5.2 Consolidation

Immediately after placing, each layer of concrete shall be consolidated by internal vibrators. The vibrators shall at all times be adequate in effectiveness and number to properly consolidate the concrete; spare vibrators shall be kept at the jobsite during all concrete placing operations. Vibrator shall be held stationary until the concrete is consolidated and then vertically withdrawn slowly while operating. Form vibrators shall not be used unless specifically approved and unless forms are constructed to withstand their use. Vibrators shall not be used to move concrete within the forms. Grate tampers ("jitterbugs") shall not be used.

### 3.5.3 Requirements For Slabs Thicker Than 2 Feet

The concrete temperature at time of delivery to the forms shall not exceed the temperature shown in the table below when measured in accordance with ASTM C 1064. Cooling of the mixing water or aggregates or placing concrete in the cooler part of the day may be required to obtain an adequate placing temperature. A retarder may be used, as approved, to facilitate placing and finishing. Steel forms and reinforcements shall be cooled as approved prior to concrete placement when steel temperatures are greater than 120 degrees F. Conveying and placing equipment shall be cooled if necessary to

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maintain proper concrete-placing temperature.

#### Maximum Allowable Concrete Placing Temperature

Relative Humidity, Percent, During Time of Concrete Placement	Maximum Allowable Concrete Temperature Degrees
Greater than 60	75 F
40-60	70 F
Less than 40	65 F

Concrete shall not be placed during periods that ambient temperatures are forecasted to exceed 90 degrees F. Except as stated above, all concrete placement shall also meet applicable requirements as specified in paragraph HOT WEATHER REQUIREMENTS.

#### 3.5.4 Cold Weather Requirements

Special protection measures, approved by Fluor Fernald, Inc., shall be used if freezing temperatures are anticipated before the expiration of the specified curing period. The ambient temperature of the air where concrete is to be placed and the temperature of surfaces to receive concrete shall be not less than 35 degrees F and with a rising temperature forecast. The temperature of the concrete itself when placed shall be not less than 50 degrees F nor more than 75 degrees F. Heating of the mixing water or aggregates will be required to regulate the concrete placing temperature. Materials entering the mixer shall be free of ice, snow, or frozen lumps. Salt, chemicals, or other materials shall not be incorporated in the concrete to prevent freezing. Upon written approval, an accelerating admixture conforming to ASTM C 494, Type C or E may be used, provided it contains no calcium chloride. Calcium chloride shall not be used. When cold weather requirements apply, perform work in accordance with applicable recommendations in ACI 306R, unless otherwise noted.

#### 3.5.5 Hot Weather Requirements

When the ambient temperature during concrete placing, other than for mat foundation concrete placement areas, is expected to exceed 85 degrees F, the concrete shall be placed in accordance with ACI 305R, and finished with procedures as specified herein. The concrete temperature at time of delivery to the forms shall not exceed the temperature shown in the table below when measured in accordance with ASTM C 1064. Cooling of the mixing water or aggregates or placing concrete in the cooler part of the day may be required to obtain an adequate placing temperature. A retarder may be used, as approved, to facilitate placing and finishing. Steel forms and reinforcements shall be cooled as approved prior to concrete placement when steel temperatures are greater than 120 degrees F. Conveying and placing equipment shall be cooled if necessary to maintain proper concrete-placing temperature.

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Maximum Allowable Concrete Placing Temperature

Relative Humidity, Percent, During Time of Concrete Placement	Maximum Allowable Concrete Temperature Degrees
Greater than 60	90 F
40-60	85 F
Less than 40	80 F

3.5.6 Prevention of Plastic Shrinkage Cracking

During hot weather with low humidity, and particularly with appreciable wind, as well as interior placements when space heaters produce low humidity, the Contractor shall be alert to the tendency for plastic shrinkage cracks to develop and shall institute measures to prevent this. Particular care shall be taken if plastic shrinkage cracking is potentially imminent and especially if it has developed during a previous placement. Periods of high potential for plastic shrinkage cracking can be anticipated by use of Fig. 2.1.5 of ACI 305R. In addition the concrete placement shall be further protected by erecting shades and windbreaks and by applying fog sprays of water, sprinkling, ponding, or wet covering. Plastic shrinkage cracks that occur shall be filled by injection of epoxy resin as directed, after the concrete hardens. Plastic shrinkage cracks shall never be troweled over or filled with slurry.

3.5.7 Placing Flowable Concrete

If a plasticizing admixture conforming to ASTM C 1017 is used or if a Type F high range water reducing admixture is permitted to increase the slump, the concrete shall meet all requirements of paragraph GENERAL REQUIREMENTS in PART 1. Extreme care shall be used in conveying and placing the concrete to avoid segregation. Consolidation and finishing shall meet all requirements of paragraphs PLACING CONCRETE, FINISHING FORMED SURFACES, AND FINISHING UNFORMED SURFACES. No relaxation of requirements to accommodate flowable concrete will be permitted.

3.6 JOINTS

Joints shall be located and constructed as indicated or as otherwise submitted by Contractor and approved. Joints not indicated on the drawings shall be located and constructed to minimize the impact on the strength of the structure. Joints in walls and columns shall be at the underside of floors, slabs, beams, or girders and at the tops of footings or floor slabs, unless otherwise approved. Joints shall be perpendicular to the main reinforcement. All reinforcement shall be continued across joints, except that reinforcement or other fixed metal items shall not be continuous through expansion joints, or as noted for construction or contraction joints in slabs on grade. Reinforcement shall be 2 inches clear from each joint. The perimeters of the slabs shall be free of fins, rough edges, spalling, or other unsightly appearance. Reservoir for sealant for construction and contraction joints in slabs shall be formed to the dimensions shown on the drawings by removing snap-out joint-forming inserts, by sawing sawable inserts, or by sawing to widen the top portion of sawed joints.

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### 3.6.1 Construction Joints

Fresh concrete shall not be placed against adjacent hardened concrete until it is at least 5 days old for mat foundation concrete areas and 24 hours old for all other areas. Construction joints shall be located as indicated or approved in writing by Fluor Fernald, Inc. Where concrete work is interrupted by weather, end of work shift, or other similar type of delay, location and type of construction joint shall be subject to approval by Fluor Fernald, Inc. Unless otherwise indicated and except for slabs on grade, reinforcing steel shall extend through construction joints. Construction joints in slabs on grade shall be keyed or doweled as shown. Concrete columns, walls, or piers shall be in place at least 2 hours, or until the concrete begins to lose its plasticity, before placing concrete for beams, girders, or slabs thereon. In walls having door or window openings, lifts shall terminate at the top and bottom of the opening. Other lifts shall terminate at such levels as to conform to structural requirements or architectural details. Where horizontal construction joints in walls or columns are required other than the construction joint located at top of the slab, a strip of 1 inch square-edge lumber, bevelled and oiled to facilitate removal, shall be tacked to the inside of the forms at the construction joint. Concrete shall be placed to a point 1 inch above the underside of the strip. The strip shall be removed 1 hour after the concrete has been placed, and any irregularities in the joint line shall be leveled off with a wood float, and all laitance shall be removed. Prior to placing additional concrete, horizontal construction joints shall be prepared as specified in paragraph Previously Placed Concrete.

### 3.6.2 Contraction Joints in Slabs on Grade

Contraction joints shall be located and detailed as shown on the drawings. Contraction joints shall be produced by forming a weakened plane in the concrete slab by use of rigid inserts impressed in the concrete during placing operations, use of snap-out plastic joint forming inserts, or sawing a continuous slot with a concrete saw. Unless otherwise noted on the drawing, the contraction joint shall be 1/4 the depth of the slab thickness and between 1/8 and 3/16 inch wide. For saw-cut joints, cutting shall be timed properly with the set of the concrete. Cutting shall be started as soon as the concrete has hardened sufficiently to prevent raveling of the edges of the saw cut. Cutting shall be completed before shrinkage stresses become sufficient to produce cracking. If saw-cutting is selected, the Contractor shall plan on saw-cutting slabs the same day as the pour is made rather than the next day to ensure that cracking does not develop at unplanned locations. Reservoir for joint sealant shall be formed as previously specified.

### 3.6.3 Expansion Joints

Installation of expansion joints and sealing of these joints shall conform to the requirements of Section 03150 EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS.

### 3.6.4 Waterstops

Waterstops shall be installed in conformance with the locations and details shown on the drawings using materials and procedures specified in Section 03150 EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS.

### 3.6.5 Dowels and Tie Bars

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Dowels and tie bars shall be installed at the locations shown on the drawings and to the details shown, using materials and procedures specified in Section 03200 CONCRETE REINFORCEMENT and herein. Conventional smooth "paving" dowels shall be installed in slabs using approved methods to hold the dowel in place during concreting within a maximum alignment tolerance of 1/8 inch in 12 inches. "Structural" type deformed bar dowels, or tie bars, shall be installed to meet the specified tolerances. Care shall be taken during placing adjacent to and around dowels and tie bars to ensure there is no displacement of the dowel or tie bar and that the concrete completely embeds the dowel or tie bar and is thoroughly consolidated.

### 3.7 FINISHING FORMED SURFACES

Forms, form materials, and form construction are specified in Section 03100 STRUCTURAL CONCRETE FORMWORK. Finishing of formed surfaces shall be as specified herein. Unless another type of architectural or special finish is specified, surfaces shall be left with the texture imparted by the forms except that defective surfaces shall be repaired. Unless painting of surfaces is required, uniform color of the concrete shall be maintained by use of only one mixture without changes in materials or proportions for any structure or portion of structure that requires a Class A or B finish. Except for major defects, as defined hereinafter, surface defects shall be repaired as specified herein within 24 hours after forms are removed. Repairs of the so-called "plaster-type" will not be permitted in any location. Tolerances of formed surfaces shall conform to the requirements of ACI 117/117R. These tolerances apply to the finished concrete surface, not to the forms themselves; forms shall be set true to line and grade. Form tie holes requiring repair and other defects whose depth is at least as great as their surface diameter shall be repaired as specified in paragraph Damp-Pack Mortar Repair. Defects whose surface diameter is greater than their depth shall be repaired as specified in paragraph Repair of Major Defects. Repairs shall be finished flush with adjacent surfaces and with the same surface texture. Concrete with excessive honeycomb or other defects which affect the strength of the member will be rejected. Repairs shall be demonstrated to be acceptable and free from cracks or loose or drummy areas at the completion of the contract and, for Class A and B Finishes, shall be inconspicuous. Repairs not meeting these requirements will be rejected and shall be replaced.

#### 3.7.1 Class A Finish and Class B Finish

Class A or B finish, when required for areas, is noted on drawings. Fins, ravelings, and loose material shall be removed. All surface defects over 1/2 inch in diameter or more than 1/2 inch deep shall be repaired and, except as otherwise indicated or as specified in Section 03100 STRUCTURAL CONCRETE FORMWORK, holes left by removal of form ties shall be reamed and filled. Defects more than 1/2 inch in diameter shall be cut back to sound concrete, but in all cases at least 1 inch deep. Metal tools shall not be used to finish repairs in Class A surfaces.

#### 3.7.2 Class C and Class D Finish

Class C or D finish, when required for areas, is noted on drawings. Fins, ravelings, and loose material shall be removed and, except as otherwise indicated or as specified in Section 03100 STRUCTURAL CONCRETE FORMWORK, holes left by removal of form ties shall be reamed and filled. Honeycomb and other defects more than 1/2 inch deep or more than 2 inches in diameter shall be repaired. Defects more than 2 inches in diameter shall be cut back to sound concrete, but in all cases at least 1 inch deep.

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### 3.8 REPAIRS

#### 3.8.1 Damp-Pack Mortar Repair

Form tie holes requiring repair and other defects whose depth is at least as great as their surface diameter but not over 4 inches shall be repaired by the damp-pack mortar method. Form tie holes shall be reamed and other similar defects shall be cut out to sound concrete. The void shall then be thoroughly cleaned, thoroughly wetted, brush-coated with a thin coat of neat cement grout, and filled with mortar. Mortar shall be a stiff mix of 1 part portland cement to 2 parts fine aggregate passing the No. 16 mesh sieve and minimum amount of water. Only sufficient water shall be used to produce a mortar which, when used, will stick together on being molded into a ball by a slight pressure of the hands and will not exude water but will leave the hands damp. Mortar shall be mixed and allowed to stand for 30 to 45 minutes before use with remixing performed immediately prior to use. Mortar shall be thoroughly tamped in place in thin layers using a hammer and hardwood block. Holes passing entirely through walls shall be completely filled from the inside face by forcing mortar through to the outside face. All holes shall be packed full. Damp-pack repairs shall be moist cured for at least 48 hours.

#### 3.8.2 Repair of Major Defects

Major defects will be considered to be those more than 1/2 inch deep or, for Class A and B finishes, more than 1/2 inch in diameter and, for Class C and D finishes, more than 2 inches in diameter. Also included are any defects of any kind whose depth is over 4 inches or whose surface diameter is greater than their depth. Major defects shall be repaired as specified below. Repairs larger than that specified may require the entire removal and replacement of the affected member according to Fluor Fernald, Inc., direction.

##### 3.8.2.1 Surface Application of Mortar Repair

Defective concrete shall be removed, and removal shall extend into completely sound concrete. Approved equipment and procedures which will not cause cracking or microcracking of the sound concrete shall be used. If reinforcement is encountered, concrete shall be removed so as to expose the reinforcement for at least 2 inches on all sides. All such defective areas greater than 12 square inches shall be outlined by saw cuts at least 1 inch deep. Defective areas less than 12 square inches shall be outlined by a 1 inch deep cut with a core drill in lieu of sawing. All saw cuts shall be straight lines in a rectangular pattern in line with the formwork panels. After concrete removal, the surface shall be thoroughly cleaned by high pressure washing to remove all loose material. Surfaces shall be kept continually saturated for the first 12 of the 24 hours immediately before placing mortar and shall be damp but not wet at the time of commencing mortar placement. The Contractor, at his option, may use either hand-placed mortar or mortar placed with a mortar gun. If hand-placed mortar is used, the edges of the cut shall be perpendicular to the surface of the concrete. The prepared area shall be brush-coated with a thin coat of neat cement grout. The repair shall then be made using a stiff mortar, preshrunk by allowing the mixed mortar to stand for 30 to 45 minutes, then remixed, and thoroughly tamped into place in thin layers. If hand-placed mortar is used, the Contractor shall test each repair area for drumminess by firm tapping with a hammer and shall inspect for cracks, both in the presence of the Fluor Fernald, Inc.'s representative and immediately before

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completion of the contract, and shall replace any showing drumminess or cracking. If mortar placed with a mortar gun is used, the gun shall be a small compressed air-operated gun to which the mortar is slowly hand fed and which applies the mortar to the surface as a high-pressure stream, as approved. Repairs made using shotcrete equipment will not be accepted. The mortar used shall be the same mortar as specified for damp-pack mortar repair. If gun-placed mortar is used, the edges of the cut shall be beveled toward the center at a slope of 1:1. All surface applied mortar repairs shall be continuously moist cured for at least 7 days. Moist curing shall consist of several layers of saturated burlap applied to the surface immediately after placement is complete and covered with polyethylene sheeting, all held closely in place by a sheet of plywood or similar material rigidly braced against it. Burlap shall be kept continually wet.

### 3.8.3 Resinous and Latex Material Repair

In lieu of the portland cement bonding coats specified above, an epoxy resin or a latex bonding agent may be used.

## 3.9 FINISHING UNFORMED SURFACES

The finish of all unformed surfaces shall meet the requirements of paragraph Tolerances in PART 1, when tested as specified herein.

### 3.9.1 General

The ambient temperature of spaces adjacent to unformed surfaces being finished and of the base on which concrete will be placed shall be not less than 50 degrees F. In hot weather all requirements of paragraphs Hot Weather Requirements and Prevention of Plastic Shrinkage Cracking shall be met. Unformed surfaces that are not to be covered by additional concrete or backfill shall have a float finish, with additional finishing as specified below, and shall be true to the elevation shown on the drawings. Surfaces to receive additional concrete or backfill shall be brought to the elevation shown on the drawings, properly consolidated, and left true and as an irregular surface. Unless otherwise shown on the drawings, exterior surfaces shall be sloped for drainage, as directed. Where drains are provided, interior floors shall be evenly sloped to the drains. Joints shall be carefully made with a jointing or edging tool. The finished surfaces shall be protected from stains or abrasions. Grate tampers or "jitterbugs" shall not be used for any surfaces. The dusting of surfaces with dry cement or other materials or the addition of any water during finishing shall not be permitted. If bleedwater is present prior to finishing, the excess water shall be carefully dragged off or removed by absorption with porous materials such as burlap. During finishing operations, extreme care shall be taken to prevent over finishing or working water into the surface; this can cause "crazing" (surface shrinkage cracks which appear after hardening) of the surface. Any slabs with surfaces which exhibit significant crazing shall be removed and replaced. During finishing operations, surfaces shall be checked with a 10-ft straightedge, applied in both directions at regular intervals while the concrete is still plastic, to detect high or low areas.

### 3.9.2 Rough Slab Finish

As a first finishing operation for unformed surfaces and as final finish for slabs to receive future walls and pads, the surface shall receive a rough slab finish. The concrete shall be uniformly placed across the slab

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area, consolidated as previously specified, and then screeded with straightedge strikeoffs immediately after consolidation to bring the surface to the required finish level with no coarse aggregate visible. Side forms and screed rails shall be provided, rigidly supported, and set to exact line and grade. Allowable tolerances for finished surfaces apply only to the hardened concrete, not to forms or screed rails. Forms and screed rails shall be set true to line and grade. "Wet screeds" shall not be used.

### 3.9.3 Floated Finish

Slabs to receive more than a rough slab finish shall next be given a wood float finish. Areas as defined on the drawings shall be given only a float finish. The screeding shall be followed immediately by darbying or bull floating before bleeding water is present, to bring the surface to a true, even plane. Then, after the concrete has stiffened and the water sheen has disappeared, it shall be floated to a true and even plane free of ridges. Floating shall be performed by use of suitable hand floats or power driven equipment. Sufficient pressure shall be used on the floats to bring a film of moisture to the surface. Hand floats shall be made of wood, magnesium, or aluminum. Lightweight concrete or concrete that exhibits stickiness shall be floated with a magnesium float. Care shall be taken to prevent over-finishing or incorporating water into the surface.

### 3.9.4 Troweled Finish

Areas as indicated on the drawings shall be given a trowel finish. After floating is complete and after the surface moisture has disappeared, unformed surfaces shall be steel-troweled to a smooth, even, dense finish, free from blemishes including trowel marks. In lieu of hand finishing, an approved power finishing machine may be used in accordance with the directions of the machine manufacturer. Additional trowelings shall be performed, either by hand or machine until the surface has been troweled at least 2 times, with waiting period between each. Refer to drawings for the number of times troweling is required for each applicable surface. Care shall be taken to prevent blistering and if such occurs, troweling shall immediately be stopped and operations and surfaces corrected. The finished surface shall be thoroughly consolidated, shall be essentially free of trowel marks, and be uniform in texture and appearance.

### 3.9.5 Non-Slip Finish

Non-slip floors shall be constructed in accordance with the following subparagraph.

#### 3.9.5.1 Broomed

Areas as indicated on the drawings shall be given a broomed finish. After floating, the surface shall be lightly steel troweled and then carefully scored by pulling a coarse fiber push-type broom across the surface. Brooming shall be transverse to traffic or at right angles to the slope of the slab. After the end of the curing period, the surface shall be vigorously broomed with a coarse fiber broom to remove all loose or semi-detached particles.

### 3.10 EXTERIOR SLAB AND RELATED ITEMS

#### 3.10.1 Pavements

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Structural concrete pavement shall be constructed where shown on the drawings. After forms are set and underlying material prepared as specified, the concrete shall be placed uniformly throughout the area and thoroughly vibrated. As soon as placed and vibrated, the concrete shall be struck off and screeded to the crown and cross section and to such elevation above grade that when consolidated and finished, the surface of the pavement will be at the required elevation. The entire surface shall be tamped with the strike off, or consolidated with a vibrating screed, and this operation continued until the required compaction and reduction of internal and surface voids are accomplished. Care shall be taken to prevent bringing excess paste to the surface. Immediately following the final consolidation of the surface, the pavement shall be floated longitudinally. If necessary, additional concrete shall be placed and screeded, and the float operated until a satisfactory surface has been produced. After finishing is completed but while the concrete is still plastic, minor irregularities and score marks in the pavement surface shall be eliminated. Before the surface sheen has disappeared and well before the concrete becomes nonplastic, the surface of the pavement shall be given a nonslip texture by carefully pulling a stiff bristled broom across the finished surface. Curing shall be as specified.

### 3.10.2 Pits and Trenches

Pits and trenches shall be constructed as indicated on the drawings. Otherwise, bottoms and walls shall be placed monolithically.

## 3.11 CURING AND PROTECTION

### 3.11.1 General

Concrete shall be cured by an approved method for the period of time given below:

All concrete	7 days
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Immediately after placement, concrete shall be protected from premature drying, extremes in temperatures, rapid temperature change, mechanical injury, and damage from rain and flowing water for the duration of the curing period. Air and forms in contact with concrete shall be maintained at a temperature above 50 degrees F for the first 3 days and at a temperature above 32 degrees F for the remainder of the specified curing period. Exhaust fumes from combustion heating units shall be vented to the outside of the enclosure, and heaters and ducts shall be placed and directed so as not to cause areas of overheating and drying of concrete surfaces or to create fire hazards. Materials and equipment needed for adequate curing and protection shall be available and at the site prior to placing concrete. No fire or excessive heat, including welding, shall be permitted near or in direct contact with the concrete at any time. Except as otherwise permitted by paragraph Membrane Forming Curing Compounds, moist curing shall be provided for any areas to receive floor hardener, any paint or other applied coating, or to which other concrete is to be bonded. Mat foundation concrete shall be initially cured by fog misting during finishing, followed immediately by continuous moist curing and in accordance with ACI 305R. Except for plastic coated burlap, impervious sheeting alone shall not be used for curing.

### 3.11.2 Moist Curing

Concrete to be moist-cured shall be maintained continuously wet for the

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entire curing period, commencing immediately after finishing. If water or curing materials used stain or discolor concrete surfaces which are to be permanently exposed, the concrete surfaces shall be cleaned as approved. When wooden forms are left in place during curing, they shall be kept wet at all times. If steel forms are used in hot weather, nonsupporting vertical forms shall be broken loose from the concrete soon after the concrete hardens and curing water continually applied in this void. If the forms are removed before the end of the curing period, curing shall be carried out as on unformed surfaces, using suitable materials. Surfaces shall be cured by ponding, by continuous sprinkling, by continuously saturated burlap or cotton mats, or by continuously saturated plastic coated burlap. Burlap and mats shall be clean and free from any contamination and shall be completely saturated before being placed on the concrete. The Contractor shall have an approved work system to ensure that moist curing is continuous 24 hours per day.

#### 3.11.3 Membrane Forming Curing Compounds

Membrane forming curing compounds may be used on all surfaces except for those areas that are to receive any subsequent treatment depending on adhesion or bonding to the concrete. Curing compound shall be applied to formed surfaces immediately after the forms are removed and prior to any patching or other surface treatment, except the cleaning of loose sand, mortar, and debris from the surface. All surfaces shall be thoroughly moistened with water. Curing compound shall be applied to slab surfaces as soon as the bleeding water has disappeared, with the tops of joints being temporarily sealed to prevent entry of the compound and to prevent moisture loss during the curing period. Concrete surfaces which have been subjected to rainfall within 3 hours after curing compound has been applied shall be resprayed by the method and at the coverage specified. Surfaces on which clear compound is used shall be shaded from direct rays of the sun for the first 3 days. Surfaces coated with curing compound shall be kept free of foot and vehicular traffic, and from other sources of abrasion and contamination during the curing period.

#### 3.11.4 Impervious Sheeting

Except for plastic coated burlap, impervious sheeting alone shall not be used for curing except as follows. Impervious-sheet curing shall only be used on horizontal or nearly horizontal surfaces other than mat foundation concrete areas. Surfaces shall be thoroughly wetted and be completely covered with the sheeting. Sheeting shall be at least 18 inches wider than the concrete surface to be covered. Covering shall be laid with light-colored side up. Covering shall be lapped not less than 12 inches and securely weighted down or shall be lapped not less than 4 inches and taped to form a continuous cover with completely closed joints. The sheet shall be weighted to prevent displacement so that it remains in contact with the concrete during the specified length of curing. Coverings shall be folded down over exposed edges of slabs and secured by approved means. Sheets shall be immediately repaired or replaced if tears or holes appear during the curing period.

#### 3.11.5 Ponding or Immersion

Concrete shall be continually immersed throughout the curing period. Water shall not be more than 20 degrees F less than the temperature of the concrete.

#### 3.11.6 Cold Weather Curing and Protection

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When the daily ambient low temperature is less than 32 degrees F the temperature of the concrete shall be maintained above 40 degrees F for the first seven days after placing. During the period of protection removal, the air temperature adjacent to the concrete surfaces shall be controlled so that concrete near the surface will not be subjected to a temperature differential of more than 25 degrees F, and installed adjacent to the concrete surface and 2 inches inside the surface of the concrete.

### 3.12 SETTING BASE PLATES AND BEARING PLATES

After being properly positioned, bearing plates for beams and similar structural members, and machinery and equipment base plates shall be set to the proper line and elevation with damp-pack bedding mortar, except where nonshrink grout is indicated. Column base plates shall be set to the proper elevation with non-shrink grout. The thickness of the mortar or grout shall be approximately 1/24 the width of the plate, but not less than 3/4 inch. Concrete and metal surfaces in contact with grout shall be clean and free of oil and grease, and concrete surfaces in contact with grout shall be damp and free of laitance when grout is placed.

#### 3.12.1 Damp-Pack Bedding Mortar

Damp-pack bedding mortar shall consist of 1 part cement and 2 1/2 parts fine aggregate having water content such that a mass of mortar tightly squeezed in the hand will retain its shape but will crumble when disturbed. The space between the top of the concrete and bottom of the bearing plate or base shall be packed with the bedding mortar by tamping or ramming with a bar or rod until it is completely filled.

#### 3.12.2 Nonshrink Grout

Nonshrink grout shall be a ready-mixed material requiring only the addition of water. Water content shall be the minimum that will provide a flowable mixture and completely fill the space to be grouted without segregation, bleeding, or reduction of strength.

##### 3.12.2.1 Mixing and Placing of Nonshrink Grout

Mixing and placing shall be in conformance with the material manufacturer's instructions and as specified therein. Ingredients shall be thoroughly dry-mixed before adding water. After adding water, the batch shall be mixed for 3 minutes. Batches shall be of size to allow continuous placement of freshly mixed grout. Grout not used within 30 minutes after mixing shall be discarded. The space between the top of the concrete or machinery-bearing surface and the plate shall be filled solid with the grout. Forms shall be of wood or other equally suitable material for completely retaining the grout on all sides and on top and shall be removed after the grout has set. The placed grout shall be carefully worked by rodding or other means to eliminate voids; however, overworking and breakdown of the initial set shall be avoided. Grout shall not be retempered or subjected to vibration from any source. Where clearances are unusually small, placement shall be under pressure with a grout pump. Temperature of the grout and of surfaces receiving the grout shall be maintained at 65 to 85 degrees F until after setting.

##### 3.12.2.2 Treatment of Exposed Surfaces

For metal-oxidizing nonshrink grout, exposed surfaces shall be cut back 1

inch and immediately covered with a parge coat of mortar consisting of 1 part portland cement and 2 1/2 parts fine aggregate by weight, with sufficient water to make a plastic mixture. The parge coat shall have a smooth finish. For other mortars or grouts, exposed surfaces shall have a smooth-dense finish and be left untreated. Curing shall comply with paragraph CURING AND PROTECTION.

### 3.13 TESTING AND INSPECTION FOR CONTRACTOR QUALITY CONTROL

The Contractor shall perform the inspection and tests described below and, based upon the results of these inspections and tests, shall take the action required and shall submit specified reports. Materials may be subjected to check testing by Fluor Fernald, Inc., from samples obtained at the manufacturer, at transfer points, or at the project site. Fluor Fernald, Inc., may inspect the laboratory, equipment, and test procedures prior to start of concreting operations and during operations as deemed necessary.

#### 3.13.1 Concrete Mixture

- a. Air Content Testing. Air content tests shall be made when test specimens are fabricated. In addition, at least two tests for air content shall be made on randomly selected batches of each separate concrete mixture produced during each 8-hour period of concrete production. Additional tests shall be made when excessive variation in workability is reported by the placing foreman or Fluor Fernald, Inc. inspector. Tests shall be made in accordance with ASTM C 231 for normal weight concrete.
- b. Air Content Corrective Action. Whenever a test result is outside the specification limits, the concrete shall not be delivered to the forms and an adjustment shall be made to the dosage of the air-entrainment admixture.
- c. Slump Testing. In addition to slump tests which shall be made when test specimens are fabricated, at least four slump tests shall be made on randomly selected batches in accordance with ASTM C 143 for each separate concrete mixture produced during each 8-hour or less period of concrete production each day. Also, additional tests shall be made when excessive variation in workability is reported by the placing foreman or Fluor Fernald, Inc., inspector.
- d. Slump Corrective Action. Whenever a slump test result is higher than the specification limits, the truck shall be rejected.

Whenever a slump test result is lower than the specification limits, the concrete shall not be delivered to the forms and an adjustment should be made in the batch weights of water and fine aggregate. The adjustments are to be made so that the water-cement ratio does not exceed that specified in the submitted concrete mixture proportion. If adjusted, note on delivery ticket amount of water added and name of person authorizing.

- e. Temperature. The temperature of the concrete shall be measured when compressive strength specimens are fabricated. Measurement shall be in accordance with ASTM C 1064. The temperature shall be reported along with the compressive strength data.
- f. Strength Specimens. At least one set of test specimens shall be

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made for compressive strength on each different concrete mixture placed during the day for each 150 cubic yards, or portion thereof, of that concrete mixture placed each day. Additional sets of test specimens shall be made, as directed by the Fluor Fernald, Inc., when the mixture proportions are changed or when low strengths have been detected. A set of test specimens for concrete with a 28-day specified strength in accordance with paragraph Strength Requirements in PART 1 shall consist of five specimens; one to be tested at 7 days, two at 28 days, one reserved for additional testing if required, and one left at the site for field curing and strength testing if desired. Test specimens shall be molded and cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39 for test cylinders. Results of all strength tests shall be reported immediately to Fluor Fernald, Inc.

### 3.13.2 Inspection Before Placing

Foundations, construction joints, forms, and embedded items shall be inspected by the Contractor in sufficient time prior to each concrete placement to certify to Fluor Fernald, Inc. that they are ready to receive concrete. The results of each inspection shall be reported in writing.

### 3.13.3 Placing

The placing foreman shall supervise placing operations, shall determine that the correct quality of concrete or grout is placed in each location as specified and as directed by Fluor Fernald, Inc., and shall be responsible for measuring and recording concrete temperatures and ambient temperature hourly during placing operations, weather conditions, time of placement, volume placed, and method of placement. The placing foreman shall not permit batching and placing to begin until it has been verified that an adequate number of vibrators in working order and with competent operators are available. Placing shall not be continued if any pile of concrete is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, immediate steps shall be taken to improve temperature controls.

### 3.13.4 Cold-Weather Protection

At least once each shift and once per day on non-work days, an inspection shall be made of all areas subject to cold-weather protection. Any deficiencies shall be noted, corrected, and reported.

### 3.13.5 Field Inspection and Testing Reports

The results of all tests and inspections conducted at the project site shall be reported informally at the end of each shift and in writing weekly. A fully summarized report shall be submitted at the end of each monthly reporting period. Reports shall include a summary of all inspections performed, number of cubic yards of concrete placed and location, concrete testing results (strength, slump, air content, ambient and concrete temperature) and curing history.

### 3.14 Final Acceptance

Acceptance of the structure(s) will be made in accordance with ACI 301 and ACI 117/117R.

The Contractor will be required to restore unacceptable cracked sections or

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members to their design strength and appearance by acceptable methods. Depending on the extent of the crack, such repairs may be performed by use of suitable epoxy resins. Epoxy resin repairs shall be performed by competent individuals having satisfactorily demonstrated ability and skill in the techniques necessary to accomplish such repairs, or by other satisfactory methods.

-- End of Section --

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## SECTION 07900

## JOINT SEALING

## PART 1 GENERAL

## 1.1 SCOPE

This specification covers the requirements for sealing joints in building construction. Joints in fire-rated construction, including control joints, construction joints, joints in floor/ceiling slabs, and joints between fire-rated walls and adjacent construction are specified in Section 09260, JOINT SEALING. Sealants provided for wall panels, siding, and roof components shall be per manufacturer's recommendations.

## 1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 734	(1993) Low-Temperature Flexibility of Latex Sealants After Artificial Weathering
ASTM C 834	(1995) Latex Sealants
ASTM C 920	(2002) Elastomeric Joint Sealants
ASTM D 217	(1997) Cone Penetration of Lubricating Grease (IP50/88)
ASTM E 84	(2000a) Surface Burning Characteristics of Building Materials

## 1.3 SUBMITTALS

Fluor Fernald, Inc. approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

## SD-03 Product Data

Backing; G.

Bond-Breaker; G.

Sealant; G.

Manufacturer's descriptive data including storage requirements, shelf life, curing time, instructions for mixing and application, and primer data (if required). A copy of the Material Safety Data Sheet shall be provided for each solvent, primer, or sealant material.

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#### SD-07 Certificates

Sealant; G.

Certificates of compliance stating that the materials conform to the specified requirements.

#### 1.4 ENVIRONMENTAL REQUIREMENTS

The ambient temperature shall be within the limits of 40 to 90 degrees F when the sealants are applied.

#### 1.5 DELIVERY AND STORAGE

Materials shall be delivered to the job in the manufacturer's original unopened containers. The container label or accompanying data sheet shall include the following information as applicable: manufacturer, name of material, formula or specification number, lot number, color, date of manufacture, mixing instructions, shelf life, and curing time at the standard conditions for laboratory tests. Materials shall be handled and stored to prevent inclusion of foreign materials. Materials shall be stored at temperatures between 40 and 90 degrees F unless otherwise specified by the manufacturer.

#### 1.6 SEALANT DEFINITIONS

The following is a partial list of definitions pertaining to sealants. Items listed below are used in PART 2 of this Section.

Type M - Multi-component sealant

Type S - Single-component sealant

Grade P - Pourable sealant, normally for horizontal joints.

Grade NS - Non-sag sealant, normally for vertical joints.

Class 25 - Generally sealants with  $\pm$  25 percent movement potential.

Use T - Traffic joint sealant, pedestrian and vehicular traffic.

Use NT - Sealants designed for nontraffic exposures

Use M, G, A - Sealants that remain adhered to mortar (M), glass (G), and aluminum (A).

Use O - Sealants that remain adhered to substrate materials other than M, G, and A.

#### PART 2 PRODUCTS

##### 2.1 BACKING

Provide sealant backings that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing. Backing shall be 25 to 33 percent oversized for closed cell and 40 to 50 percent oversized for open cell material, unless otherwise indicated.

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### 2.1.1 Cylindrical Sealant Backings

ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

- a. Type C: Closed-cell material with a surface skin.
- b. Type O: Open-cell material.
- c. Type B: Bicellular material with a surface skin.

Type used shall be that recommended by sealant manufacturer.

### 2.2 BOND-BREAKER

Bond-breaker shall be as recommended by the sealant manufacturer to prevent adhesion of the sealant to backing or to bottom of the joint.

### 2.3 PRIMER

Primer shall be nonstaining type as recommended by sealant manufacturer for the application.

### 2.4 SEALANT

#### 2.4.1 LATEX

Latex Sealant shall be ASTM C 834. Use for control joints and perimeter joints in rated and non-rated gypsum board walls and ceilings. May be painted after installation with quality latex or oil-base paints.

- a. AC-20, Silicone Acrylic Latex Sealant or approved equivalent. Pecora Corporation, 165 Wambold Road, Harleysville, PA. 19348 General purpose interior caulking in architectural applications where slight to moderate movement is anticipated in non-rated walls and ceilings.
- b. AC-20 FTR, Silicone Acrylic Latex Sealant or approved equivalent. Pecora Corporation, 165 Wambold Road, Harleysville, PA. 19348 General purpose interior and exterior caulking in architectural applications where slight to moderate movement is anticipated in fire-rated walls and ceilings.

#### 2.4.2 ELASTOMERIC

Elastomeric sealants shall conform to ASTM C 920 and the following:

##### 2.4.2.1 Polysulfide Sealant S-1:

Type M, Grade NS or P, Class 25, Use T or NT, M, G, A, O.

Use: Wall or floor joints in concrete or masonry that may be immersed in liquids or exposed to chemicals. Product shall be one of the following:

- a. Synthacalk - GC2+, Pecora Corporation, 165 Wambold Road, Harleysville, PA. 19348. Phone (800) 523-6688.
- b. Deck-O-Seal, W. R. Meadows, Inc., Hampshire, IL 60140-0338. Phone

(800) 342-5976. Available in pourable or gun-grade.

- c. Approved equivalent products by other manufacturers.

2.4.2.2 Polyurethane Sealant S-2:

Type M, grade NS, Class 25, Use NT, M, G, A, O.

Use: General purpose sealant for concrete and masonry walls, where vertical joints are subject to movement such as expansion and control joints, and a water-tight seal is required. Products shall be one of the following:

- a. Dynatrol II, Pecora Corporation, 165 Wambold Road, Harleysville, PA. 19348. Phone (800) 523-6688.

- b. Approved equivalent products by other manufacturers.

2.4.2.3 Polyurethane Sealant S-3:

Type M, grade NS/P, Class 25, Use T, M, A, O.

Use: Heavy-traffic area sealant for concrete floors where horizontal joints are subject to movement such as expansion and control joints, and a water-tight seal is required. Products shall be one of the following:

- a. Dynatred, Pecora Corporation, 165 Wambold Road, Harleysville, PA. 19348. Phone (800) 523-6688.

- b. Approved equivalent products by other manufacturers.

2.4.2.4 Silicone Sealant S-4:

Type S, Grade NS, Class 25, Use NT, M, G, A, O.

Use: Exterior sealant with excellent long-term movement properties. Use for exterior sealant at door frames, thresholds, and wall panel openings. Can be used with most building materials. Products shall be one of the following:

- a. 890, Pecora Corporation, 165 Wambold Road, Harleysville, PA. 19348. Phone (800) 523-6688.

- b. 795, Dow Corning Corp., Midland, MI 48686-0994. Phone (517)496-6000

- c. Approved equivalent products by other manufacturers.

2.4.3 ACOUSTICAL

Rubber or polymer-based acoustical sealant shall have a flame spread of 25 or less and a smoke development rating of 50 or less when tested in accordance with ASTM E 84. Acoustical sealant shall have a consistency of 250 to 310 when tested in accordance with ASTM D 217. Sealant shall remain flexible and adhesive after 500 hours of accelerated weathering as specified in ASTM C 734, and shall be nonstaining. Use in locations where partitions must be isolated from floor for noise and sound reduction.

2.4.3.1 Product

This product shall be used in conjunction with gypsum wallboard partitions. Product shall be as recommended by drywall system manufacturer. Install between floor and stud runner according to manufacturer's written instructions.

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## 2.5 MASKING TAPE

Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints. Use products recommended by sealant manufacturer.

## 2.6 SOLVENTS AND CLEANING AGENTS

Solvents, cleaning agents, and accessory materials shall be provided as recommended by the manufacturer.

## PART 3 EXECUTION

### 3.1 GENERAL

#### 3.1.1 Surface Preparation

The surfaces of joints to receive sealant or caulk shall be free of all frost, condensation, and moisture. Oil, grease, dirt, chalk, particles of mortar, dust, loose rust, loose mill scale, and other foreign substances shall be removed from surfaces of joints to be in contact with the sealant.

Oil and grease shall be removed with solvent and surfaces shall be wiped dry with clean cloths. For surface types not listed below, the sealant manufacturer shall be contacted for specific recommendations.

#### 3.1.2 Concrete and Masonry Surfaces

Where surfaces have been treated with curing compounds, oil, or other such materials, the materials shall be removed by sandblasting or wire-brushing. Laitance, efflorescence, and loose mortar shall be removed from the joint cavity.

#### 3.1.3 Steel Surfaces

Steel surfaces to be in contact with sealant shall be sandblasted or, if sandblasting would not be practical or would damage adjacent finish work, the metal shall be scraped and wire brushed to remove loose mill scale. Protective coatings on steel surfaces shall be removed by sandblasting or by a solvent that leaves no residue.

#### 3.1.4 Aluminum Surfaces

Aluminum surfaces to be in contact with sealants shall be cleaned of temporary protective coatings. When masking tape is used for a protective cover, the tape and any residual adhesive shall be removed just prior to applying the sealant. Solvents used to remove protective coating shall be as recommended by the manufacturer of the aluminum work and shall be nonstaining.

#### 3.1.5 Wood Surfaces

Wood surfaces to be in contact with sealants shall be free of splinters and sawdust or other loose particles.

#### 3.1.6 Gypsum Wall Board

Surfaces to be in contact with sealants shall be free of oils and dust or particles from finishing operations.

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## GENERAL NOTES (CONTINUED FROM S0200):

## GENERAL

1. FOR ADDITIONAL GENERAL NOTES SEE SHEET S0200

## GRATING

1. GRATING FOR TRENCHES AND SUMP PITS SHALL BE TYPE C102 GALVANIZED STEEL GRATING WITH 1/2" x 1/2" BEARING BARS SPACED AT 1 1/2" AND 1/4" CROSS BARS SPACED AT 4" MAX AND END BARS, BY KC BORDEN OR APPROVED EQUAL, UNO.

## CONCRETE

1. CONCRETE AND CONCRETE WORK SHALL BE IN ACCORDANCE WITH SPECIFICATION FOR SLO 3 PROJECT, SECTIONS 03100, 03150, 03200, 03300 AND 07900.
2. STRUCTURAL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS, UNLESS OTHERWISE NOTED.
3. REINFORCING STEEL PLACEMENT DRAWINGS BASED ON APPROVED CONSTRUCTION DRAWINGS SHALL BE SUBMITTED BY THE CONTRACTOR TO FLUOR FERNALD, INC. FOR REVIEW AND APPROVAL. ALL REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM A615 GRADE 60. REINFORCEMENT SHALL BE FABRICATED TO SHAPES AND DIMENSIONS SHOWN AND SHALL CONFORM TO THE REQUIREMENTS OF ACI 308, EXCEPT WHERE OTHERWISE INDICATED OR NOTED ON THE DRAWINGS. SPICES OF REINFORCEMENT SHALL CONFORM TO ACI 308 CLASS B, BUT NOT LESS THAN 12 INCHES, UNO.
4. EXPOSED EDGES OF CONCRETE SHALL HAVE A 1/4" CHAMFER UNLESS NOTED OTHERWISE.
5. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCEMENT, UNO:
  - a. CONCRETE CAST AGAINST EARTH ..... 3 INCHES
  - b. FORMED CONCRETE EXPOSED TO EARTH OR WEATHER:
    - 6 THRU #10 BARS ..... 2 INCHES
    - 5 BARS AND SMALLER ..... 1 1/2 INCHES
  - c. CONCRETE NOT EXPOSED TO WEATHER:
    - SLABS, WALLS, JOISTS (#11 AND SMALLER) ..... 1/2 INCHES
    - SLABS, WALLS, JOISTS (#11 AND SMALLER) ..... 1/2 INCHES
    - TIES, STIRRUPS AND SPIRALS ..... 1/2 INCHES
6. ALL REINFORCING STEEL, ANCHOR BOLTS, DOVELS, EMBEDDED STEEL, AND OTHER INSERTS SHALL BE SECURED IN POSITION, INSPECTED & APPROVED PRIOR TO PLACING CONCRETE.
7. EXISTING FACILITIES SHALL BE PROTECTED DURING EXCAVATION AND FOUNDATION CONSTRUCTION. SPECIAL PRECAUTIONS SHALL BE EXERCISED TO PROTECT EXISTING FOUNDATIONS EXCAVATION ADJACENT TO EXISTING FOOTINGS SHALL BE BY HAND.
8. WHERE BAR AND ANCHOR BOLT LOCATIONS COINCIDE, OR NEARLY SO, BAR SHALL BE PLACED TO CLEAR ANCHOR BOLT BEFORE PLACING CONCRETE.
9. LOCATIONS OF EQUIPMENT AND EMBEDDED ITEMS SUCH AS PIPES, SLEEVES, CONDUITS, AND OPENINGS OR RECESSES REQUIRED BY ARCHITECTURAL, MECHANICAL, ELECTRICAL, PIPING AND OTHER DISCIPLINES SHALL BE COORDINATED WITH RESPECTIVE DISCIPLINE DRAWINGS BY THE CONTRACTOR PRIOR TO PLACEMENT.
10. LOCATIONS OF EQUIPMENT PADS ARE PRELIMINARY AND ARE SHOWN FOR INFORMATION PURPOSES ONLY. FINAL LOCATIONS SHALL BE VERIFIED FROM RESPECTIVE EQUIPMENT DRAWINGS PRIOR TO CONSTRUCTION. FINAL EQUIPMENT PAD SIZES SHALL BE COORDINATED WITH VENDOR PRINTS AND STANDARD DETAILS.
11. EQUIPMENT PADS ON SLAB-ON-GRADE MAY BE COMBINED WHEN APPROVED IN WRITING BY FLUOR FERNALD. COMBINED EQUIPMENT PADS SHALL NOT DISTURB WATER DRAINAGE ROUTES, PERSONNEL ACCESS AND EGRESS PATHS.
12. CONCRETE FINISHES:
  - a. EXPOSED UNFORMED INTERIOR SURFACES SHALL BE GIVEN A TROPEL FINISH, UNO.
  - b. EXPOSED UNFORMED EXTERIOR SURFACES SHALL BE GIVEN A TROPEL FINISH, UNO.
  - c. EXPOSED UNFORMED EXTERIOR SURFACES SUCH AS ROOF GIR THAT SHALL BE COVERED WITH UNFORMED MATERIALS. SHALL BE GIVEN A TROPEL FINISH.
  - d. FORMED SURFACES EXPOSED TO VIEW SHALL BE DESIGNATED CLASS C.
  - e. FORMED SURFACES CONCEALED FROM VIEW SHALL BE DESIGNATED CLASS D.
13. ALL DOVELS OR REINFORCING FOR WALLS AND COLUMN PERS SHALL EXTEND TO THE BOTTOM LAYER OF REBARS IN FOOTINGS AND MAT FOUNDATION, WITH 90 DEGREE END HOOKS.

## FOUNDATIONS

1. ALL FOUNDATIONS AND STRUCTURES ARE DESIGNED FOR IN-PLACE LOADS. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS AND PROVIDE ADEQUATE TEMPORARY SHORING AND BRACING DURING THE CONSTRUCTION AND EQUIPMENT ERECTION PHASES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE INCURRED UPON THE FOUNDATIONS AND STRUCTURES.
2. ALL EXISTING STRUCTURES AND FOUNDATIONS, WHICH ARE TIED TO NEW CONSTRUCTION SHALL BE FIELD MEASURED AND VERIFIED BY THE CONTRACTOR. ANY DEVIATION IN DIMENSIONS AND ELEVATIONS FROM THE CONTRACT DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR RESOLUTION.
3. CONTRACTOR SHALL MAINTAIN CONSTRUCTION SITE FREE OF STANDING WATER DURING THE CONSTRUCTION PHASES OF THE WORK. THE CONTRACTOR SHALL PROVIDE TEMPORARY PUMPING FACILITIES TO REMOVE THE WATER.
4. ALL EXCAVATION, FILLING, BACKFILLING, FOUNDATION AND ROADWAY CONSTRUCTION SHALL BE IN ACCORDANCE WITH SPECIFICATION 40430-TS-0004 AND 40430-TS-0007.
5. THE IN-PLACE COMPACTED FILLS SHALL BE TESTED FOR SPECIFIED MOISTURE AND DENSITY REQUIREMENTS, AT FREQUENCIES PER PROJECT SPECIFICATIONS.

## DESIGN NOTES

1. DESIGN IS IN ACCORDANCE WITH THE OHIO BUILDING CODE, 2002.

2. FLOOR LIVE LOAD = 125 P.S.F. (UNO)  
EXCAVATOR BUILDING FLOOR LIVE LOAD = 250 P.S.F.
3. ROOF LIVE LOAD = 20 P.S.F. (ALL ROOFS, UNO).

4. ROOF SNOW LOAD
  - A. FLAT ROOF SNOW LOAD = 20.0 P.S.F.
  - B. SNOW EXPOSURE FACTOR, CE = 1.0.
  - C. SNOW LOAD IMPORTANCE FACTOR, I = 1.0.
  - D. THERMAL FACTOR, CU = (SEE SCHEDULE 2)

5. WIND LOAD
  - A. BASIC WIND SPEED = 90 M.P.H.
  - B. WIND IMPORTANCE FACTOR, I = 1.0
  - C. BUILDING CATEGORY = I
  - D. WIND EXPOSURE = C
  - E. INTERNAL PRESSURE COEFFICIENT = 0.55.
  - F. COMPONENTS AND CLADDING = NOT APPLICABLE

6. EARTHQUAKE DESIGN DATA
  - A. SEISMIC USE GROUP = I
  - B. SPECTRAL RESPONSE COEFFICIENTS: SDS = 0.19G, SD1 = 0.14G
  - C. SITE CLASS = D
  - D. BASIC SEISMIC FORCE RESISTING SYSTEM FOR EXCAVATOR BUILDING = (SEE SCHEDULE 2)
  - E. DESIGN BASE SHEAR FOR EXCAVATOR BUILDING = (SEE SCHEDULE 2)
  - F. ANALYSIS PROCEDURE = EQUIVALENT LATERAL FORCE PROCEDURE

## DESIGN NOTES (CONTINUED)

7. PRELIMINARY FOUNDATION AND SLAB DESIGN IS BASED ON THE FOLLOWING:

- A. SOIL DATA:  
ALLOWABLE NET SOIL BEARING CAPACITY = 2000 PSF  
EXCAVATOR BUILDING AND SLO ENCLOSURE FOUNDATION = 3500 PSF
- B. FORKLIFT TRUCK:  
APPROVED LOCATIONS: CARGO CONTAINER BUILDING  
TAYLOR MODEL TY-820M  
GROSS VEHICLE WEIGHT = 72,450 LBS.  
LOAD CAPACITY = 52,000 LBS.  
TIRES: 17.5" WIDE X 25" DIA. RM  
WHEEL BASE: 197"  
OVERALL WIDTH: 118.5"  
OVERALL LENGTH: 263"  
TIRE PRESSURE: 90 PSI FOR FRONT TIRES, 70 PSI FOR REAR TIRES  
FRONT TIRE CONTACT AREA: 2XX SQUARE INCHES/2 TIRES

## ANCHORS

1. ANCHOR BOLT MATERIAL SHALL BE AS SPECIFIED ON SHEET S0128.
2. EMBEDDED HEADED WELD STUDS SHALL CONFORM TO ASTM A615.
3. ALL ANCHORS CAST IN HARDENED CONCRETE ARE SUBJECT TO THE FOLLOWING LIMITATIONS:
  - a. EPOXY TYPE DRILLED-IN ANCHORS SHALL NOT BE USED IN CEILINGS, WALLS, OR OTHER APPLICATIONS WHERE CONSTANT LOAD MAY CAUSE CREEP, UNLESS MANUFACTURER'S DATA DEMONSTRATES THE SUITABILITY FOR THIS PURPOSE.
  - b. EPOXY TYPE DRILLED-IN ANCHORS SHALL BE USED IN ALL FLOOR APPLICATIONS WHERE OPERATING TEMPERATURES PERMIT.
  - c. EFFORTS SHALL BE MADE TO AVOID CUTTING OR DAMAGING REINFORCING STEEL WHEN INSTALLING DRILLED-IN ANCHORS. NOTIFY FLUOR FERNALD, INC. IMMEDIATELY IF REINFORCING STEEL IS CUT OR DAMAGED.
  - d. TENSILE AND SHEAR CAPACITY AND EMBEDMENT LENGTH OF DRILLED-IN ANCHORS SHALL BE EQUIVALENT TO THE INDICATED CAST-IN-PLACE ANCHORS, AND SHALL BE SUBSTITUTED BY DESIGN CALCULATIONS.
  - e. DESIGN CRITERIA FOR DRILLED-IN ANCHORS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS. ALL ANCHOR BOLTS SHALL BE CONSIDERED TO BE SUBJECT TO SEISMIC FORCES AND THE CAPACITY AND SUITABILITY OF THE MANUFACTURER'S DATA, THE CAPACITY AND SUITABILITY OF EXPANSION TYPE DRILLED-IN ANCHORS FOR VIBRATING EQUIPMENT SHALL BE SUBSTITUTED BY THE MANUFACTURER'S DATA. EPOXY ANCHORS SHALL BE VERIFIED FOR SUITABILITY FOR USE AT THE TEMPERATURES TO WHICH THEY WILL BE SUBJECTED.
  - f. DRILLED-IN ANCHORS SHALL NOT BE PLACED IN JOINTS (CONSTRUCTION, CONTRACTION, ISOLATION, OR EXPANSION) OR IN ANY REGULARITIES IN THE CONCRETE WHICH WILL DIMINISH THE CAPACITY OF THE ANCHORS. MINIMUM EDGE DISTANCE AND BOLT SPACINGS ADJACENT TO JOINTS SHALL BE IN ACCORDANCE WITH ANCHOR BOLT MANUFACTURER'S REQUIREMENTS AND THESE DRAWINGS.
4. ANCHORAGE FOR ALL CONTRACTOR FURNISHED EQUIPMENT AND SUPPORTS SHALL BE DESIGNED, FURNISHED AND INSTALLED BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT THE ANCHOR BOLT PLACEMENT TOLERANCES ARE COMPATIBLE WITH EQUIPMENT INSTALLATION REQUIREMENTS. WHEN EQUIPMENT IS DELIVERED TO THE SITE PRIOR TO ANCHOR BOLT PLACEMENT, CONTRACTOR SHALL VERIFY THAT MANUFACTURED EQUIPMENT DIMENSIONS AND SHALL ADJUST ANCHOR BOLT LOCATIONS TO SUIT.
5. ANCHORS IN HARDENED CONCRETE SHALL BE HELD BY 150 OR HVA WEDGES OR APPROVED EQUIV.

## SOIL PREPARATION

1. SITE SHALL BE PREPARED AND FOUNDATIONS ESTABLISHED IN ACCORDANCE WITH SLO 3 PROJECT SPECIFICATION, SECTIONS 02100, 02120, 02130, 02200, 02210, 02220, 02230, 02240 AND 02272.
2. A MINIMUM OF ALL TOPSOIL, UNDOCUMENTED AND UNCONTROLLED FILL, PLUS OVEREXCAVATION SHALL BE REMOVED FROM WITHIN THE CONSTRUCTION LIMITS.
3. ALL FOUNDATION EXCAVATIONS SHALL BE OVEREXCAVATED A MINIMUM OF 6 INCHES BELOW THE BEARING SURFACE OF THE FOUNDATION. ANY SOFT SOIL POCKETS SHALL BE UNDERCUT AND BACKFILLED IN ACCORDANCE WITH THE SPECIFICATIONS.
4. COMPACT THE TOP 1500 OF SOIL BELOW THE GRANULAR FILL TO AT LEAST 95% OF THE MAXIMUM DRY UNIT WEIGHT WITH A MOISTURE CONTENT WITHIN 2% OF THE OPTIMUM MOISTURE CONTENT AS DETERMINED BY THE MODIFIED PROCTOR TEST (ASTM D1557).
5. VERIFY THAT SOIL BEARING PRESSURE AT THE ELEVATION OF FOUNDATION PLACEMENT IS GREATER THAN OR EQUAL TO THE ALLOWABLE BEARING PRESSURE (SEE SCHEDULE 2). AS DETERMINED BY A GEOTECHNICAL ENGINEER, PRIOR TO PLACING CONCRETE.
6. PLACE AND COMPACT GRANULAR FILL AND ALL APPROVED FILL MATERIALS TO THE ABOVE NOTED REQUIREMENTS. DO NOT PLACE GRANULAR FILL UNDER FOOTINGS OF THE SLO ENCLOSURE FOUNDATION.
7. GRANULAR FILL MATERIALS SHALL BE WELL-GRADED, ANGULAR, GRANULAR MATERIAL SUCH AS CRUSHED SAND AND GRAVEL OR CRUSHED STONE CONTAINING LESS THAN 5% OF FINES OR PARTICLES THAT CAN PASS THROUGH A NO. 200 SIEVE. GRANULAR BASE SHALL BE COMPACTED IN ACCORDANCE WITH THE SPECIFICATIONS.
8. FIELD DENSITY TESTS: SEE SPECIFICATIONS FOR FIELD DENSITY TESTS.

## ELECTRICAL GROUNDING

1. FOR ELECTRICAL GROUNDING DETAILS SEE ELECTRICAL DRAWINGS SHEETS E0100 THRU E0103.

## DAMP-PROOFING

1. SEE SHEET S0130.

REF DWG NO.	DRAWING TITLE
S0120	FOUNDATIONS - GENERAL SITE PLAN
S0121	STACK FOUNDATION AND EQUIPMENT PADS PLAN AND SECTIONS
S0122	SLO ENCLOSURE - FOUNDATION PLAN
S0123	CARGO CONTAINER BUILDING FOUNDATION PLAN AND SECTIONS
S0124	PROCESS BUILDING - FOUNDATION PLAN
S0125	EXCAVATOR BUILDING - ROOF PLAN AND SECTIONS
S0126	EXCAVATOR BUILDING FOUNDATION PLAN, SECTIONS AND DETAILS
S0127	EXCAVATOR BUILDING - SECTIONS
S0128	ANCHOR BOLT DETAILS
S0129	EXCAVATOR BUILDING CONCRETE SECTIONS AND DETAILS
S0130	EXCAVATOR BUILDING INSULATED CONVEYOR RECESS
S0133	CONCRETE DETAILS
S0131	PROCESS BUILDING FOUNDATION SECTIONS & DETAILS
S0135	SLO ENCLOSURE FOUNDATION SECTIONS AND DETAILS
S0136	ELECTRICAL BUILDING FOUNDATION PLAN, SECTIONS AND DETAILS
S0200	GENERAL NOTES - STEEL
E0100-E0103	ELECTRICAL GROUNDING AND LIGHTNING PROTECTION

INFORMATION ONLY

0	ISSUED FOR CONSTRUCTION	07/26/02	CEL	CEL
DATE	REV. BY	DATE	REV. BY	DATE
DATE	REV. BY	DATE	REV. BY	DATE

UNITED STATES  
DEPARTMENT OF ENERGY  
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

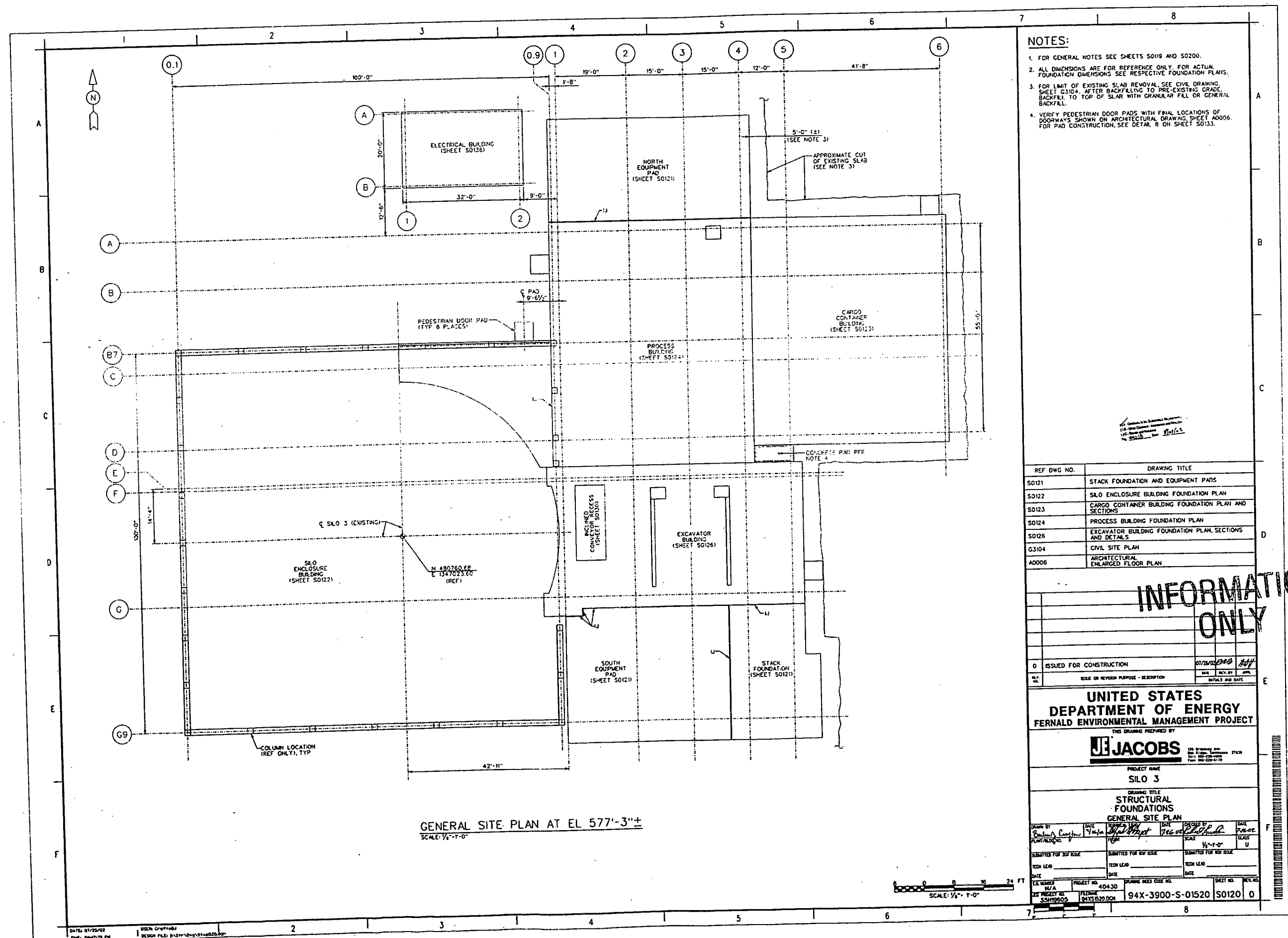
THIS DRAWING PREPARED BY  
**JACOBSON**  
PROJECT NAME  
SLO 3  
DRAWING TITLE  
STRUCTURAL  
GENERAL NOTES

DESIGNED BY	DATE	TECHNICAL LEAD	DATE	CHECKED BY	DATE
PLANNED BY	DATE	TECHNICAL LEAD	DATE	CHECKED BY	DATE
TECH LEAD	DATE	TECHNICAL LEAD	DATE	CHECKED BY	DATE
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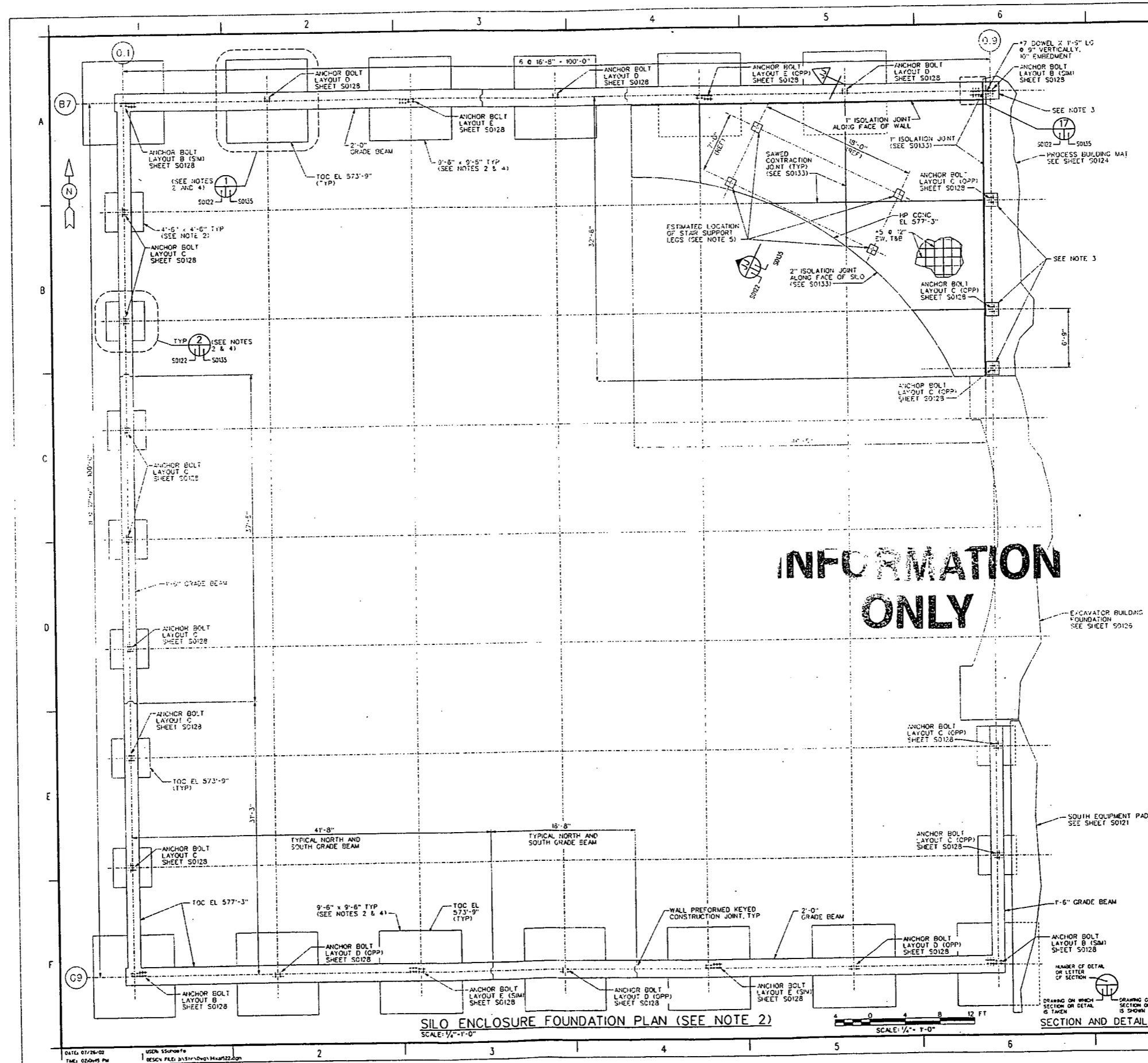
DESIGN NOTE	BUILDING	CARGO CONTAINER BUILDING	ELECTRICAL BUILDING	EXCAVATOR BUILDING	PROCESS BUILDING	SLO ENCLOSURE	STACK FOUNDATION	NORTH & SOUTH EQUIPMENT PADS
1. THERMAL FACTOR	1	1.2	1	1.2	1.2	1.2	N/A	N/A
2. BASIC SEISMIC FORCE RESISTING SYSTEM	BRACED STEEL FRAME	FUTURE (BY VENDOR)	ORDINARY REINFORCED CONCRETE SHEAR WALLS	SEE SHEET S0200	FUTURE (BY VENDOR)	N/A	N/A	N/A
3. SEISMIC DESIGN BASE SHEAR (KIPS)	UNKNOWN	FUTURE (BY VENDOR)	41.3	SEE SHEET S0200	FUTURE (BY VENDOR)	3.1	N/A	N/A
4. ALLOWABLE BEARING PRESSURE FOR FOUNDATION (PSF)	2,000	2,000	3,500	2,000	3,500	2,000	2,000	2,000

## SCHEDULE 2

000081

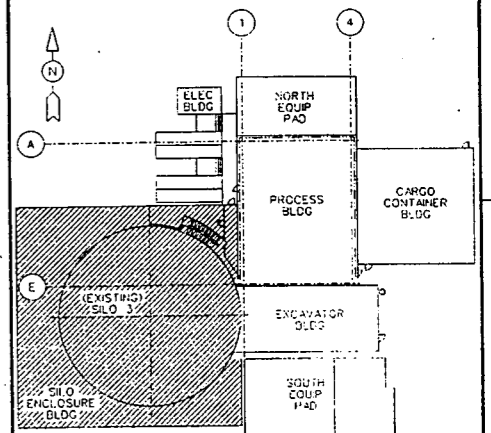






- NOTES:

1. FOR GENERAL NOTES SEE SHEETS 50119 AND 50200.
2. SIZES AND SPACING FOR ALL COLUMNS AND FOUNDATIONS TO BE BASED ON PRELIMINARY BUILDING CONFIGURATION AND FOUNDATION FORCES. FOUNDATION DESIGN AND COLUMN LAYOUT SHALL BE REVISED UPON EVALUATION OF ACTUAL BUILDING CONFIGURATION AND FOUNDATION FORCES PRIOR TO CONSTRUCTION.
3. COLUMNS NOTED FROM THE SLO ENCLOSURE BUILDING SHALL BE ANCHORED TO THE MAT AT THE LOCATION SHOWN.
4. THE INDIVIDUAL SPREAD FOOTINGS MAY BE MADE A CONTINUOUS FOOTING AT THE DIRECTION OF FLUOR FERNHALD.
5. ESTIMATED LOCATION IS FOR PRE-ANALYZED STAIR PER FOUNDATION 40430-15-0003. SUGB SHALL RE-EVALUATE FOR VENDOR SUBMITTED FINAL WEIGHT OF STAIR PRIOR TO CONSTRUCTION.



### KEY PLAN

[illegible]

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FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

**JE JACOBS**

PROJECT NAME

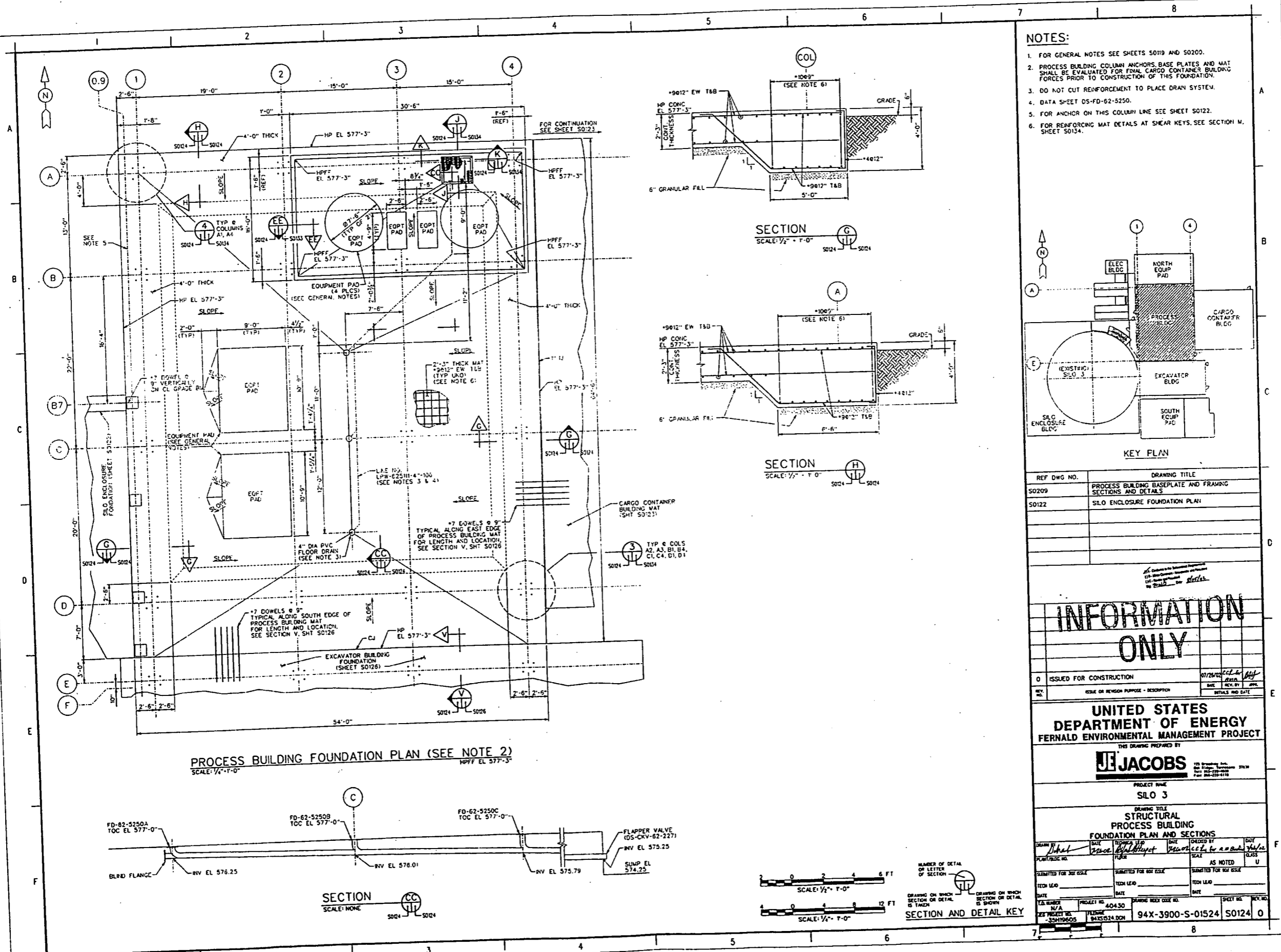
SILO 3

DRAWING TITLE  
STRUCTURAL  
SILO ENCLOSURE  
FOUNDATION PLAN

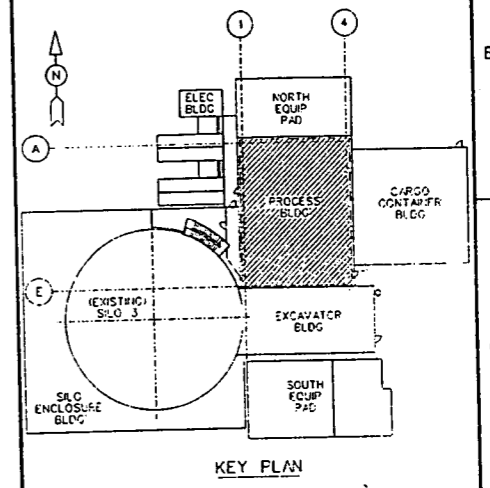
FOUNDATION PLAN					
DRAWN BY <i>Shelley</i>	DATE <i>2/20/02</i>	DESIGNED BY <i>Shelley</i>	DATE <i>2/20/02</i>	CHECKED BY <i>CCL &amp; R.M.W.</i>	DATE <i>7/16/02</i>
PLANT/SCALE NO.		FIGURE		SCALE	CLASS
				$1/4"=1'-0"$	U
SUBMITTED FOR JOB ISSUE		SUBMITTED FOR DAY ISSUE		SUBMITTED FOR SEC ISSUE	
TECH LEAD		TECH LEAD		TECH LEAD	
		DATE		DATE	
T. NUMBER	PROJECT NO.	QUANTITY INDEX CODE NO.		SHEET NO.	REV. NO.
N/A	40430				
THIS PROJECT NO.	FIGURE				
	00122 DOW	94X-3900-S-01522	S0122	0	

000084





- NOTES:**
1. FOR GENERAL NOTES SEE SHEETS S019 AND S020.
  2. PROCESS BUILDING COLUMN ANCHORS, BASE PLATES AND MAT SHALL BE EVALUATED FOR FINAL CARGO CONTAINER BUILDING FORCES PRIOR TO CONSTRUCTION OF THIS FOUNDATION.
  3. DO NOT CUT REINFORCEMENT TO PLACE DRAIN SYSTEM.
  4. DATA SHEET DS-FD-62-5250.
  5. FOR ANCHOR ON THIS COLUMN LINE SEE SHEET S022.
  6. FOR REINFORCING MAT DETAILS AT SHEAR KEYS, SEE SECTION M, SHEET S0134.



REF DWG NO.	DRAWING TITLE
S0209	PROCESS BUILDING BASEPLATE AND FRAMING SECTIONS AND DETAILS
S0122	SLO ENCLURE FOUNDATION PLAN

**INFORMATION ONLY**

ISSUED FOR CONSTRUCTION	DATE: 07/24/02
ISSUE OR REVISION PURPOSE - DESCRIPTION	DETAILS AND DATE

**UNITED STATES DEPARTMENT OF ENERGY**  
**FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

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**JACOBS**

PROJECT NAME  
**SLO 3**

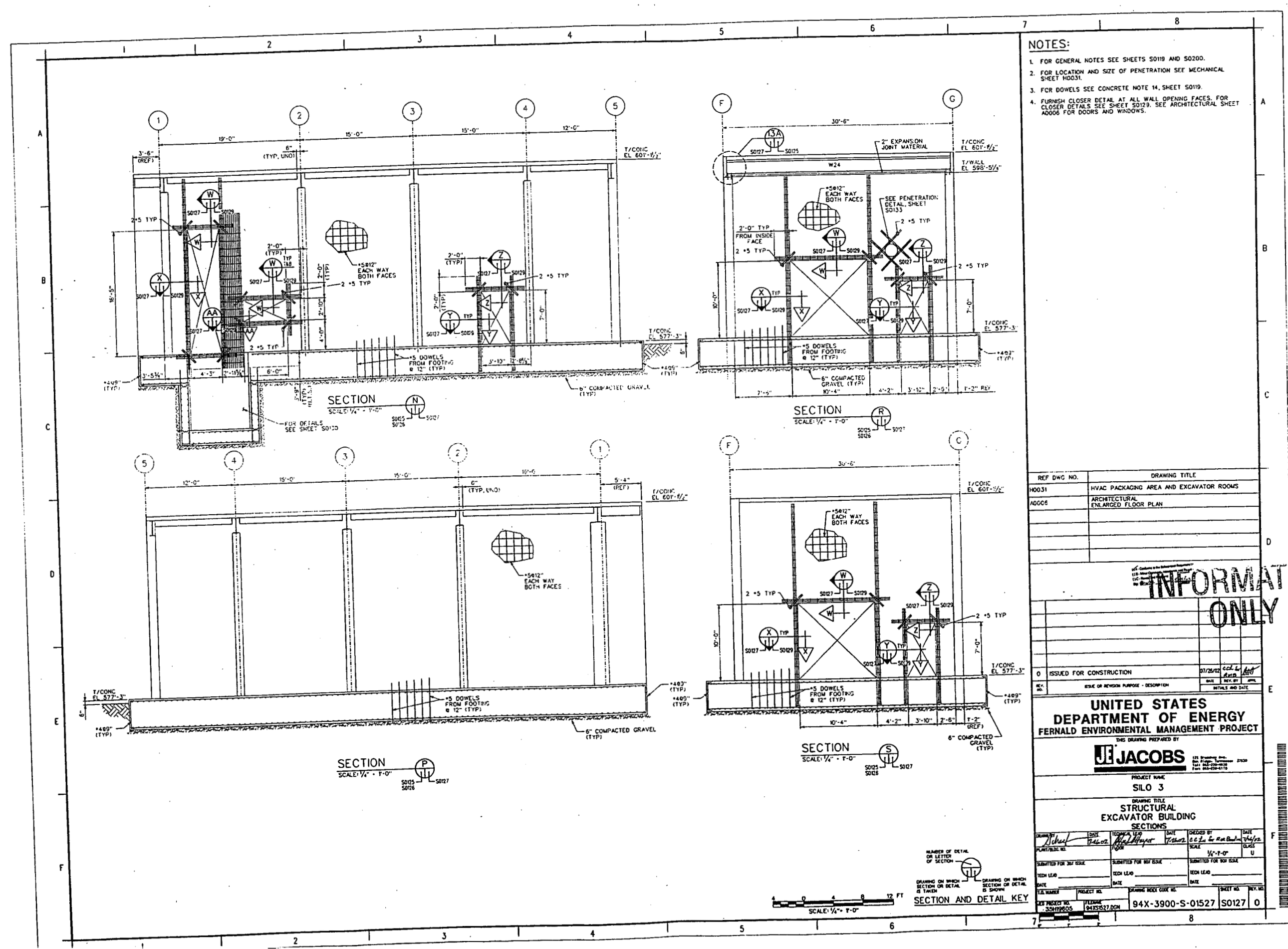
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**STRUCTURAL PROCESS BUILDING FOUNDATION PLAN AND SECTIONS**

DATE: 07/24/02	DESIGNED BY: [Signature]	CHECKED BY: [Signature]
DATE: 07/24/02	DESIGNED BY: [Signature]	CHECKED BY: [Signature]
DATE: 07/24/02	DESIGNED BY: [Signature]	CHECKED BY: [Signature]

DATE: 07/24/02 PROJECT NO: 40430 DRAWING INDEX CODE NO: 94X-3900-S-01524 SHEET NO: S0124 0







- NOTES:
1. FOR GENERAL NOTES SEE SHEETS S0119 AND S0200.
  2. FOR LOCATION AND SIZE OF PENETRATION SEE MECHANICAL SHEET H0031.
  3. FOR DOWELS SEE CONCRETE NOTE 14, SHEET S0119.
  4. FURNISH CLOSER DETAIL AT ALL WALL OPENING FACES. FOR CLOSER DETAILS SEE SHEET S0129. SEE ARCHITECTURAL SHEET A0006 FOR DOORS AND WINDOWS.

REF DWG NO.	DRAWING TITLE
H0031	HVAC PACKAGING AREA AND EXCAVATOR ROOMS
A0006	ARCHITECTURAL ENLARGED FLOOR PLAN

REV.	DESCRIPTION	DATE	BY	CHKD.	APPD.
0	ISSUED FOR CONSTRUCTION	07/25/02	CCL	L	AND

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**JACOBSON**

PROJECT NAME  
SILO 3

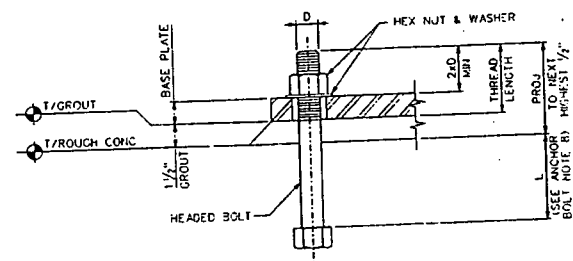
DRAWING TITLE  
STRUCTURAL  
EXCAVATOR BUILDING  
SECTIONS

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SCALE: 1/4" = 1'-0" CLASS: U

SUBMITTED FOR SET ISSUE: [ ] SUBMITTED FOR REV ISSUE: [ ] SUBMITTED FOR REV ISSUE: [ ]  
TECH LEAD: [ ] DATE: [ ] TECH LEAD: [ ] DATE: [ ] TECH LEAD: [ ] DATE: [ ]

PROJECT NO.: 94X-3900-S-01527 SHEET NO.: S0127 OF 0

INFORMATION ONLY



ANCHOR BOLT DETAIL  
SCALE: NONE

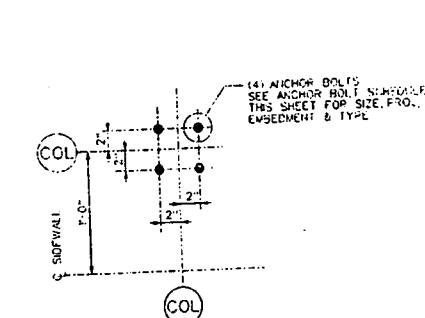
#### ANCHOR BOLT NOTES

1. SEE LAYOUT DETAILS THIS SHEET FOR ANCHOR BOLT PLACEMENT LOCATIONS.
2. ANCHOR BOLTS SHALL BE SET ACCURATELY AND HELD IN PLACE WITH A TEMPLATE.
3. MATERIAL FOR ANCHOR BOLTS SHALL CONFORM TO ASTM A307 UNF. ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153.
4. MATERIAL FOR NUTS AND WASHERS SHALL BE IN ACCORDANCE WITH SPECIFICATION 40430-TS-0003.
5. USE STANDARD CUT WASHERS FOR ANCHOR BOLTS UP TO AND INCLUDING 1 1/2" DIA.
6. ANCHOR BOLTS SHALL BE THOROUGHLY CLEANED OF RUST, THREAD CUTTING OIL, AND ANY OTHER SUBSTANCE WHICH WILL REDUCE BOND.
7. HOLES IN COLUMN BASE PLATES SHALL BE STANDARD PER AISC UNF.
8. DIMENSION "L" SHALL BE EVALUATED AND REVISED UPON RECEIPT OF FINAL VENDOR BASEPLATE DIMENSIONS.

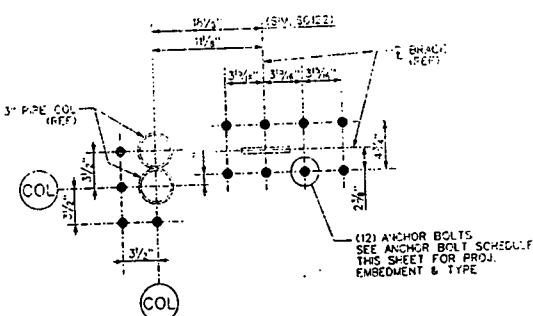
LOCATION	D (IN.)	L (IN.)	PROJ. (IN.)	MATL	BASEPLATE THICKNESS	NUTS PER ANCHOR
CARGO CONTAINER BUILDING COLUMN LINE 6	1	18	6	A307	SEE NOTES 2, 3 & 4	2
CARGO CONTAINER BUILDING BRIDGE CRANE COLUMNS	1/2	18	6	A307	SEE NOTE 2	1
CARGO CONTAINER BUILDING WIND COLUMNS	1/2	12	6	A307	SEE NOTE 2	1
ELECTRICAL BUILDING	1/2	18	4	A307	SEE NOTE 2	1
PROCESS BUILDING	SEE SHT. S0209	6	A307	SEE SHEET S0209		
SILO ENCLOSURE WIND COLUMNS	1/2	12	6	A307	SEE NOTE 2	1
SILO ENCLOSURE UNBRACED SIDEWALL COLUMNS	1/2	18	6	A307	SEE NOTE 2	1
SILO ENCLOSURE BRACED SIDEWALL COLUMNS	1/2	18	6	A307	SEE NOTE 2	1
SILO ENCLOSURE BRACES	1/2	18	4	A307	SEE NOTE 2	1
EXCAVATOR BUILDING ROOF FRAMING	1/2	18	4	A307	SEE NOTE 2	1

ANCHOR BOLT SCHEDULE (SEE NOTE 3)

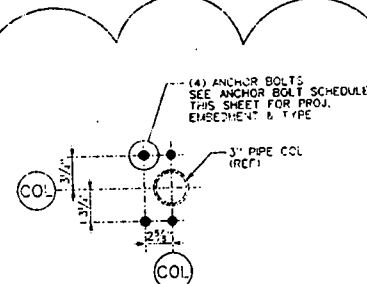
SEE NOTE 3



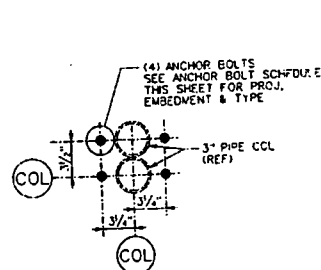
SEE PLAN ON SHEET S0123  
FOR ORIENTATION  
ANCHOR BOLT LAYOUT A  
CARGO CONTAINER BUILDING



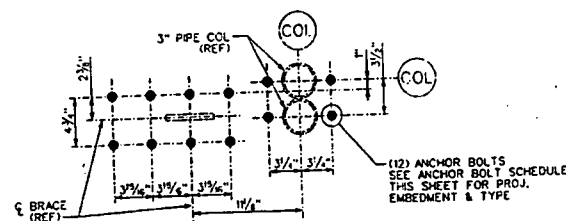
SEE SHEET S0122 FOR ORIENTATION  
ANCHOR BOLT LAYOUT B  
SILO ENCLOSURE  
SIDEWALL CORNER COLUMNS



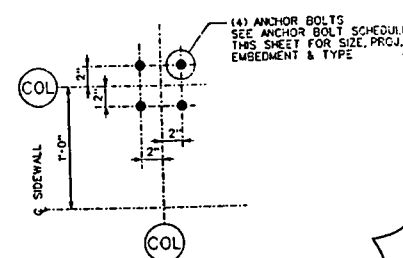
SEE SHEET S0122 FOR ORIENTATION  
ANCHOR BOLT LAYOUT C  
SILO ENCLOSURE  
GABLE END WIND COLUMNS



SEE SHEET S0122 FOR ORIENTATION  
ANCHOR BOLT LAYOUT D  
SILO ENCLOSURE  
UNBRACED SIDEWALL COLUMNS



SEE SHEET S0122 FOR ORIENTATION  
ANCHOR BOLT LAYOUT E  
SILO ENCLOSURE  
BRACED SIDEWALL COLUMNS



ANCHOR BOLT LAYOUT F  
ELECTRICAL BUILDING

#### NOTES:

1. FOR GENERAL NOTES SEE SHEETS S0119 AND S0200.
2. BASEPLATES SHALL BE FURNISHED BY BUILDING MANUFACTURER WITH THICKNESS THAT ELIMINATES PRYING FORCES TO ANCHORS.
3. ALL ANCHOR BOLT INFORMATION AND LAYOUTS ARE BASED ON PRELIMINARY INFORMATION AND SHALL BE EVALUATED FOR FINAL FOUNDATION FORCES, AND BOLT LAYOUT CONFIGURATION SUBMITTED BY VENDOR/MANUFACTURER PRIOR TO CONSTRUCTION.
4. HOLES FURNISHED IN BASEPLATES FOR ANCHORS SHALL BE STANDARD HOLES IN ACCORDANCE WITH AISC ASD MANUAL FOR STEEL CONSTRUCTION, 9th EDITION, TABLE J3.1. IF HOLES FURNISHED ARE OTHER THAN SPECIFIED ABOVE, ANCHOR SIZE AND LAYOUT SHALL BE RE-EVALUATED.

REF. DWG. NO.	DRAWING TITLE
S0209	PROCESS BUILDING BASEPLATE AND FRAMING SECTIONS AND DETAILS

INFORMATION ONLY

0	ISSUED FOR CONSTRUCTION	07/26/02	DATE	REV. BY	APP.
1	SCALE OR REVISION PURPOSE - DESCRIPTION		DATE	REV. BY	APP.

UNITED STATES  
DEPARTMENT OF ENERGY  
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY  
**JACOBS**

PROJECT NAME  
SILO 3

DRAWING TITLE  
STRUCTURAL  
FOUNDATIONS  
ANCHOR BOLT DETAILS


DRAWN BY Buckley, C. J.	DATE 7/26/02	CHECKED BY R. J. H. H.	DATE 7/26/02
DESIGNED BY N/A	DATE N/A	SCALE NONE	CLASS U
SUBMITTED FOR REVIEW DATE	SUBMITTED FOR REVIEW DATE	SUBMITTED FOR REVIEW DATE	
TECH LEAD DATE	TECH LEAD DATE	TECH LEAD DATE	
PROJECT NO. 40430	DRAWING BOOK CODE NO. 94X-3900-S-01528	SHEET NO. S0128	REV. NO. 0

NUMBER OF DETAIL  
OR LETTER  
OF SECTION  
1/1  
DRAWING ON WHICH  
SECTION OR DETAIL  
IS SHOWN  
SECTION AND DETAIL KEY

CLOSER AT HEAD  
SECTION  
SCALE: 1" = 1'-0"

CLOSER AT JAMB  
SECTION  
SCALE: 1"=1'-0"

CLOSER AT JAMB  
SECTION  
SCALE: 1"=1'-0"

CLOSER AT HEAD  
SECTION:   
SCALE: 1"=1'-0"

CLOSER AT JAMB

SECTION

SCALE: 1"=1'-0"


AA

CG17

TYPICAL CLOSER PLATE

DETAIL

SCALE:  $\frac{1}{2}" = 1'-0"$



DETAIL  
SCALE: 1/2" = 1'-0"

DETAIL  
SCALE: 1/2" = 1'-0"

STAIR PAD PLAN  
DETAIL  
SCALE: 1" = 1'-0"

SECTION  
SCALE: 1" = 1'-0"

1 0 1 2 3 FT  
SCALE: 1" = 10'-0"

2 0 2 4 6 FT  
SCALE: 1/2" = 1'-0"

NUMBER OF DETAIL  
OR LETTER  
OF SECTION

DRAWING ON WHICH  
SECTION OR DETAIL  
IS SHOWN

DRAWING ON WHICH  
SECTION OR DETAIL  
IS SHOWN

SECTION AND DETAIL KEY

NOTES:

1. FOR GENERAL NOTES SEE SHEETS S0119 AND S0200.

REF DWG NO.	DRAWING TITLE
A0024	ARCHITECTURAL - DOOR DETAILS

(1) Other Content - Nonperson and Nonperson  
(2) Other Content - Nonperson and Nonperson  
(3) Other Content - Nonperson and Nonperson

INFORMATION  
ONLY

0	ISSUED FOR CONSTRUCTION	07/26/02	CC&L RFP	AW 10/1
REV.	ISSUE OR REVISION PURPOSE - DESCRIPTION	DATE	REV. BY	APP.
			DETAILS AND DATE	

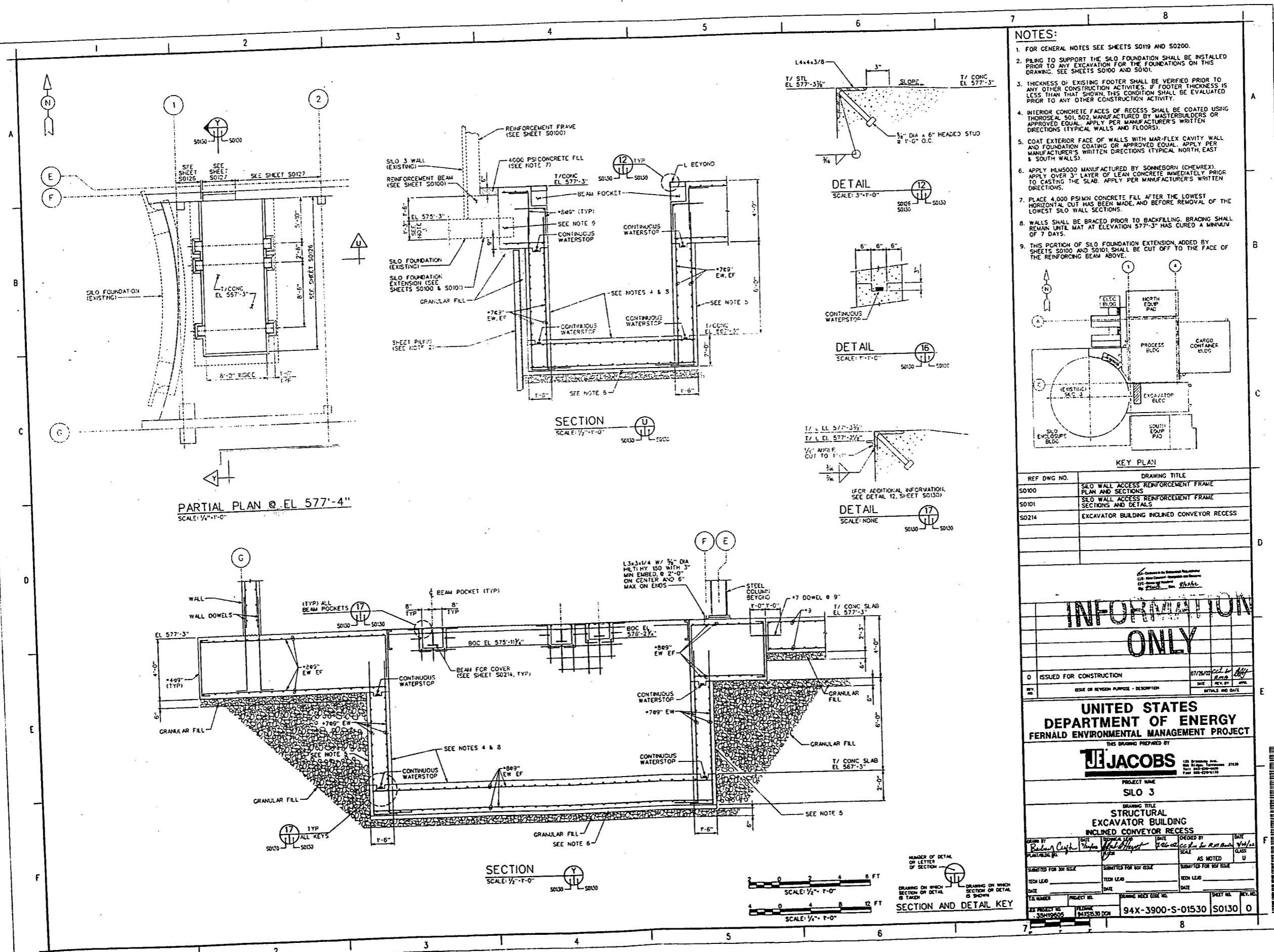
UNITED STATES  
DEPARTMENT OF ENERGY  
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

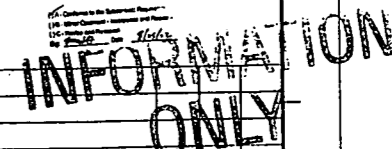
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**JE JACOBS**

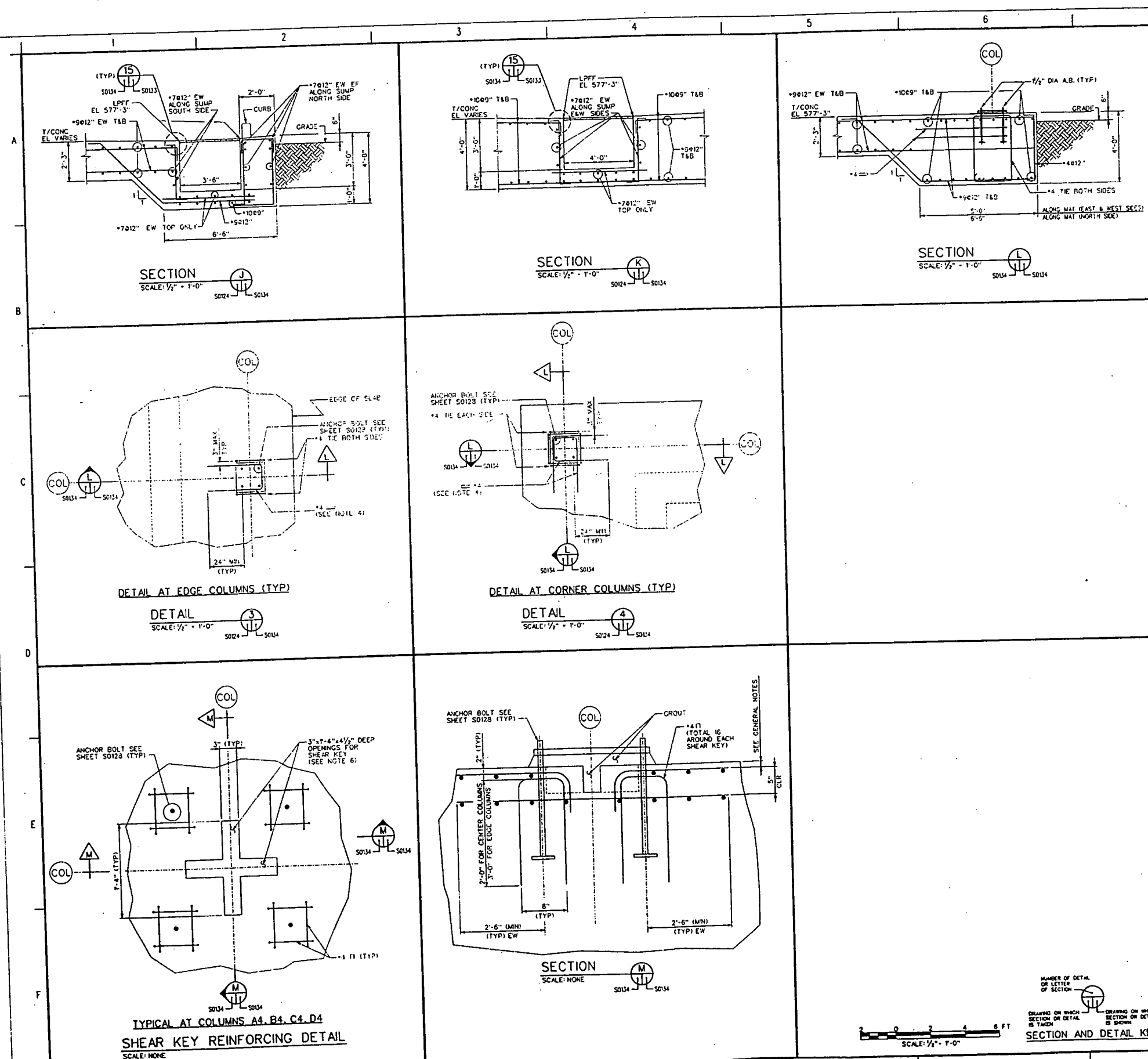
PROJECT NAME  
SILO 3

DRAWING TITLE  
STRUCTURAL  
EXCAVATOR BUILDING  
CONCRETE SECTIONS & DETAILS

GRAIN <i>Shrimp</i>		DATE <i>9-26-07</i>		ORDERED BY <i>C. S. Lee, R. Lee, Andrew</i>	DATE <i>9/26/07</i>
PLUM/BLDG NO. <i>32602 Shrimp</i>		SCALE		CLASS	
N/A		AS NOTED			
SUBMITTED FOR XOT ISSUE		SUBMITTED FOR XOT ISSUE		SUBMITTED FOR XOT ISSUE	
TECH LEAD		TECH LEAD		TECH LEAD	
DATE		DATE		DATE	
T/A NUMBER <i>94</i>		PROJECT NO. <i>40430</i>		DRAWING SHEET CODE NO.	
PROJECT NO. <i>94X-3900-S-01529</i>		PLUMBING		SHEET NO. <i>50129</i>	
		<i>94X-3900-S-01529</i>		<i>50129</i>	







- NOTES:**
1. FOR GENERAL NOTES SEE SHEETS S0119 AND S0200.
  2. MINIMUM 5" CONCRETE COVER ON TOP OF MAT UNO.
  3. FOR SHEAR KEY LOCATIONS, SEE SHEET S0201.
  4. BAR NOTED SHALL BE TIED TO ALL ANCHOR BOLTS.
  5. FOR ANCHOR BOLT DETAIL, SEE SHEET S0203.
  6. FILL KEY WITH NON-SHRINK GROUT, MINIMUM COMPRESSIVE STRENGTH OF 5000 PSI.

REF. DWG. NO.	DRAWING TITLE
S0201	FRAMING PLAN @ T/STL EL. 600'-1 1/4"

**INFORMATION ONLY**

0	ISSUED FOR CONSTRUCTION	07/26/02	cdw	ABT

**UNITED STATES DEPARTMENT OF ENERGY**  
**FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

THIS DRAWING PREPARED BY  
**JACOBS**

PROJECT NAME  
**SILLO 3**

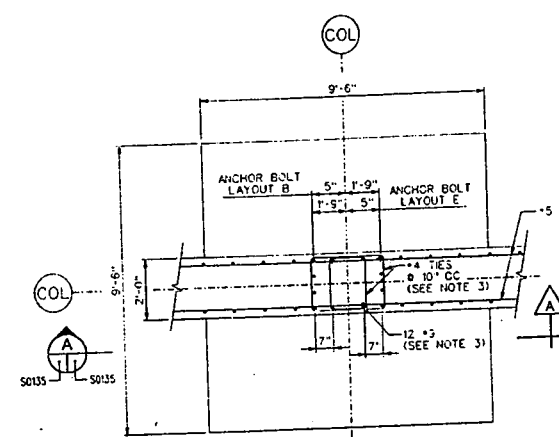
DRAWING TITLE  
**STRUCTURAL PROCESS BUILDING FOUNDATION SECTIONS AND DETAILS**

DATE: 07/26/02  
 DRAWN BY: [Signature]  
 CHECKED BY: [Signature]  
 SCALE: AS NOTED

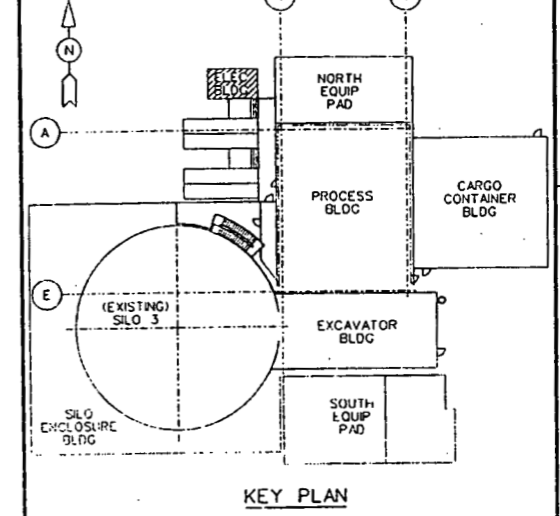
REVISIONS:

NO.	DATE	DESCRIPTION
1	07/26/02	ISSUED FOR CONSTRUCTION

PROJECT NO. 40430  
 SHEET NO. S0134 OF 0



- NOTES:
1. FOR GENERAL NOTES, SEE SHEETS S0119 AND S0200.
  2. INCREASE 3" MINIMUM DIMENSION AS NEEDED TO INSTALL ANCHORAGE COMPLETELY ON THE RAISED CONCRETE PAD.
  3. SIDING SHALL BE LOCATED TO PRECLUDE ENTRY OF WATER ONTO SLAB.
  4. ASSUMED BUILDING CONFIGURATION IS 32'-0" x 21'-0" x 15'-0" HIGH, LOW SLOPE MAX.
  5. FINAL BUILDING CONFIGURATION AND FOUNDATION FORCES, BASEPLATE SIZE AND ANY ADDITIONAL ANCHORS, SHALL BE SUBMITTED AND EVALUATED PRIOR TO FOUNDATION CONSTRUCTION.
  6. INSTALL EQUIPMENT PAD UNDER MCC.
  7. FOR ANCHORS SEE SHEET S0128.
  8. INSTALL CONDUIT WITH 1/2" THICK PIPE WRAP BY SUREVOID (OR APPROVED EQUIV) PRIOR TO PLACEMENT OF CONCRETE FOUNDATION. PIPE WRAP MAY EXTEND BEYOND EITHER SIDE OF THE FOUNDATION AS REQUIRED. PIPE WRAP SHALL BE INSTALLED PER THE MANUFACTURER'S WRITTEN INSTRUCTIONS.
  9. AT INTERFERENCE OF REINFORCEMENT WITH ANCHORS OR CONDUIT, BEND REINFORCEMENT TO MAINTAIN CLEAR COVER; DO NOT CUT REINFORCEMENT.
  10. SEE DETAIL 9 ON SHEET S0133 FOR REINFORCEMENT DETAIL AT CORNERS.



REF DWG NO.	DRAWING TITLE
S0119	GENERAL NOTES - CONCRETE
M0001	GENERAL ARRANGEMENT PLOT PLAN
E0318	ELECTRICAL SITE PLAN
E0319	ELECTRICAL DUCT BANK DETAILS
A0001	ELECTRICAL BUILDING FLOOR PLAN

ISSUED FOR CONSTRUCTION			
REV. NO.	DATE	REV. BY	INITIALS AND DATE
0	08/21/02	CMS	AMT

**UNITED STATES DEPARTMENT OF ENERGY**  
**FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

DWG PREPARED BY  
**JE JACOBS**  
125 Broadway Ave.  
Oak Ridge, Tennessee 37830  
Tel: 615-576-1000  
Fax: 615-576-6170

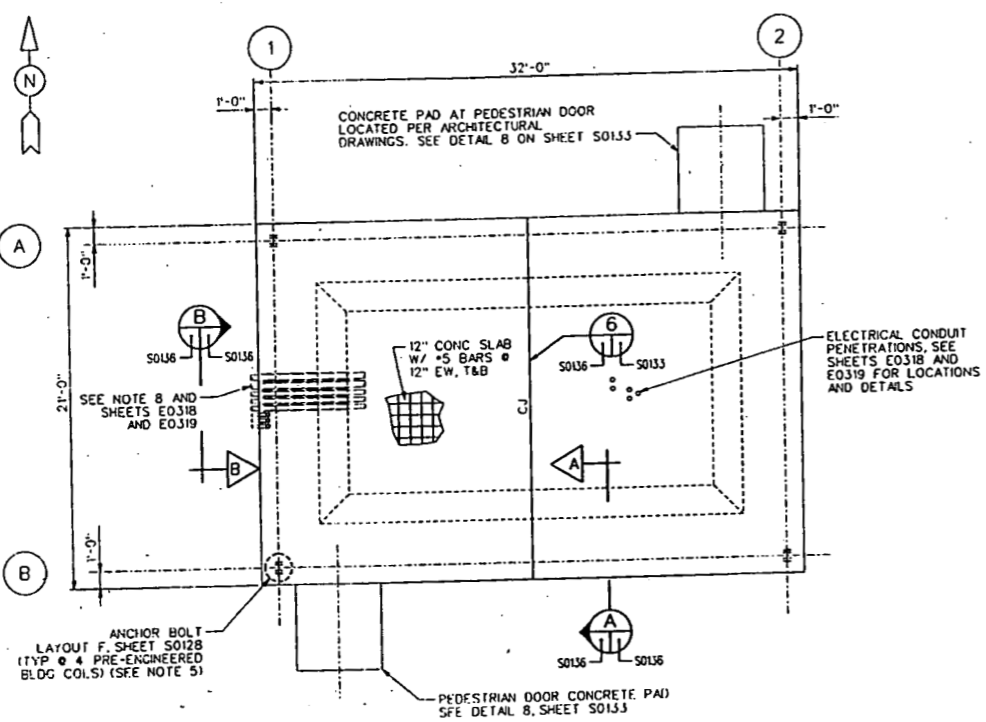
PROJECT NAME  
**SILO 3**

DRAWING TITLE  
**STRUCTURAL ELECTRICAL BUILDING FOUNDATION PLAN, SECTIONS AND DETAILS**

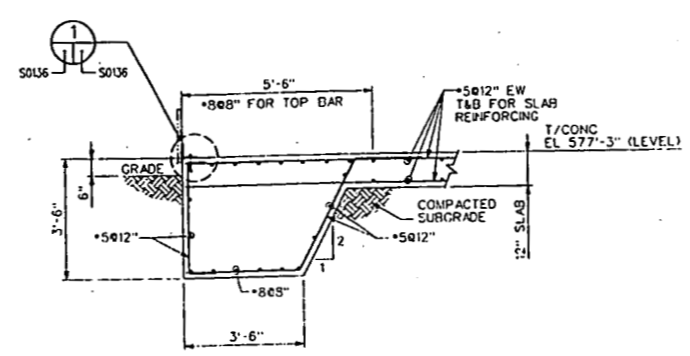
DESIGNED BY: *[Signature]* DATE: 9/2/02  
CHECKED BY: *[Signature]* DATE: 9/2/02  
SCALE: AS NOTED

DATE: 9/2/02

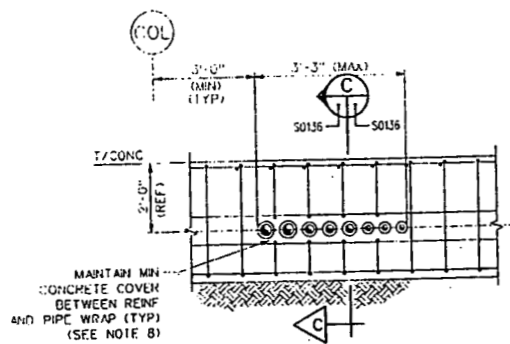
PROJECT NO. 40430  
SHEET NO. S0136  
REV. NO. 0



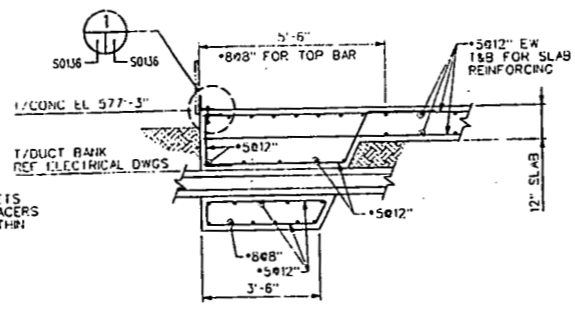
FOUNDATION PLAN (SEE NOTE 5)  
SCALE: 1/4" = 1'-0"



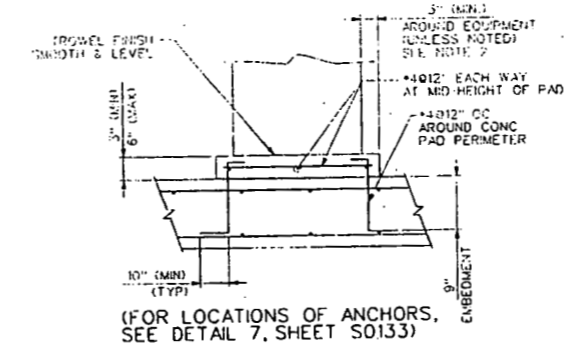
SECTION A-TYPICAL PERIMETER  
SCALE: 1/2" = 1'-0"



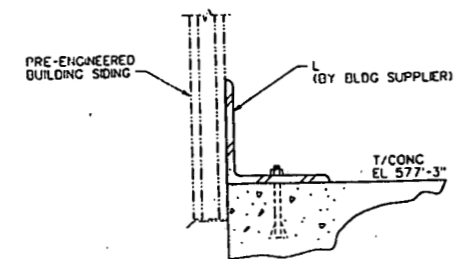
SECTION B  
SCALE: 1/2" = 1'-0"



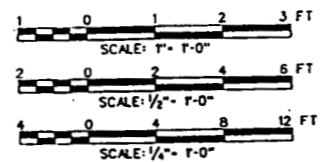
SECTION C  
SCALE: 1/2" = 1'-0"



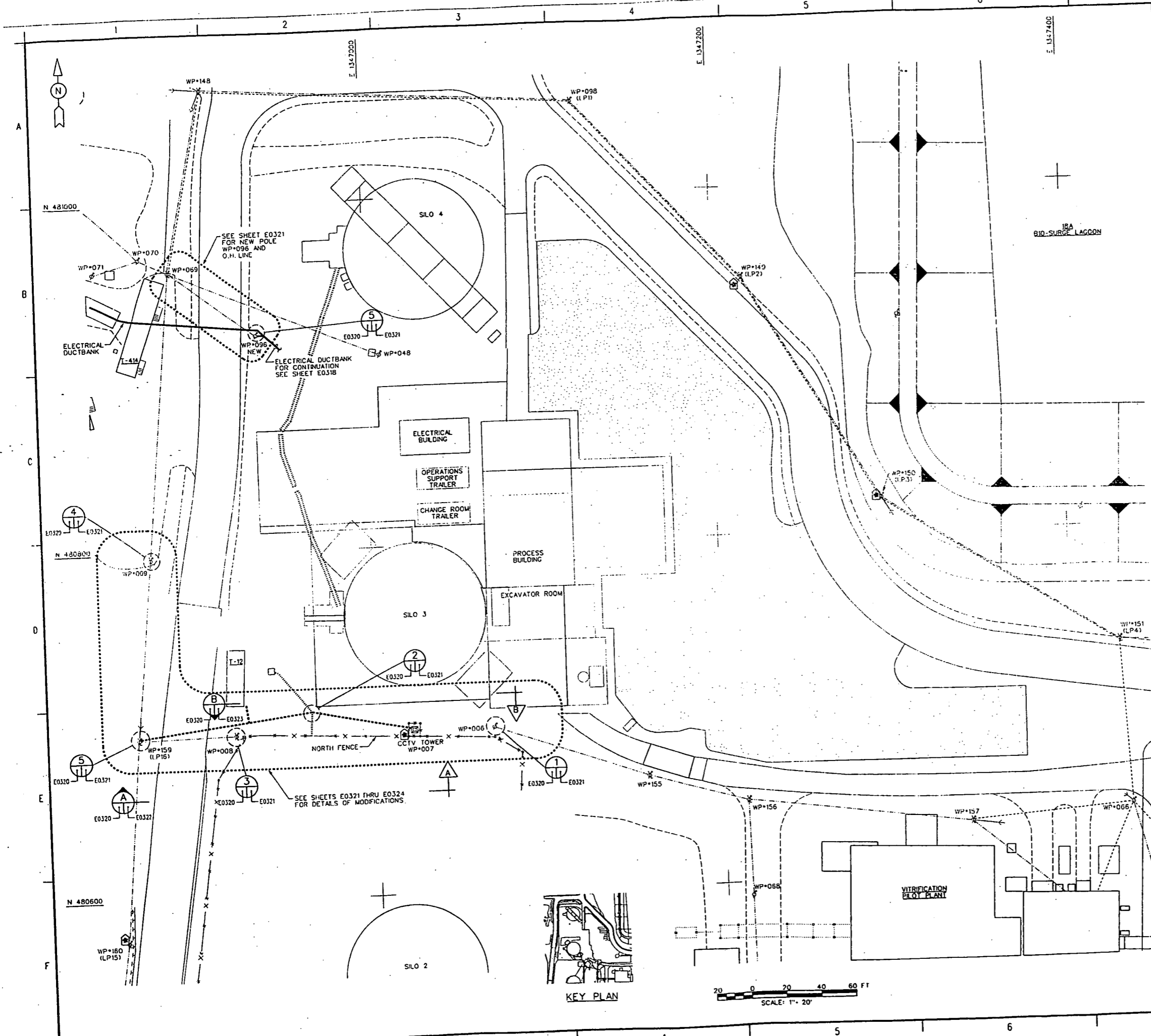
TYPICAL EQUIPMENT PAD DETAIL  
SCALE: 1" = 1'-0"



DETAIL 1  
SCALE: NONE



NUMBER OF DETAIL OR LETTER OF SECTION	DRAWING ON WHICH SECTION OR DETAIL IS SHOWN
1	SECTION A
2	SECTION B
3	SECTION C



REF DWG NO.	DRAWING TITLE
E0321	SILO INFRASTRUCTURE - POLE ELEVATIONS
E0322	SILO INFRASTRUCTURE BELOW GRADE DUCTBANKS - MISC DETAILS
E0323	SILO INFRASTRUCTURE ABOVE GRADE CONDUIT - MISC DETAILS
E0324	SILOS FEEDER FROM VIT PLANT MCC 33-B COMPARTMENT 4H

20 0 20 40 60 FT  
SCALE: 1" = 20'

INFORMATION ONLY

0	ISSUED FOR CONSTRUCTION	08/28/02	LJA	GAA
REV NO.	SCALE OR REVISION PURPOSE - DESCRIPTION	DATE	REV. BY	APP.

UNITED STATES  
DEPARTMENT OF ENERGY  
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

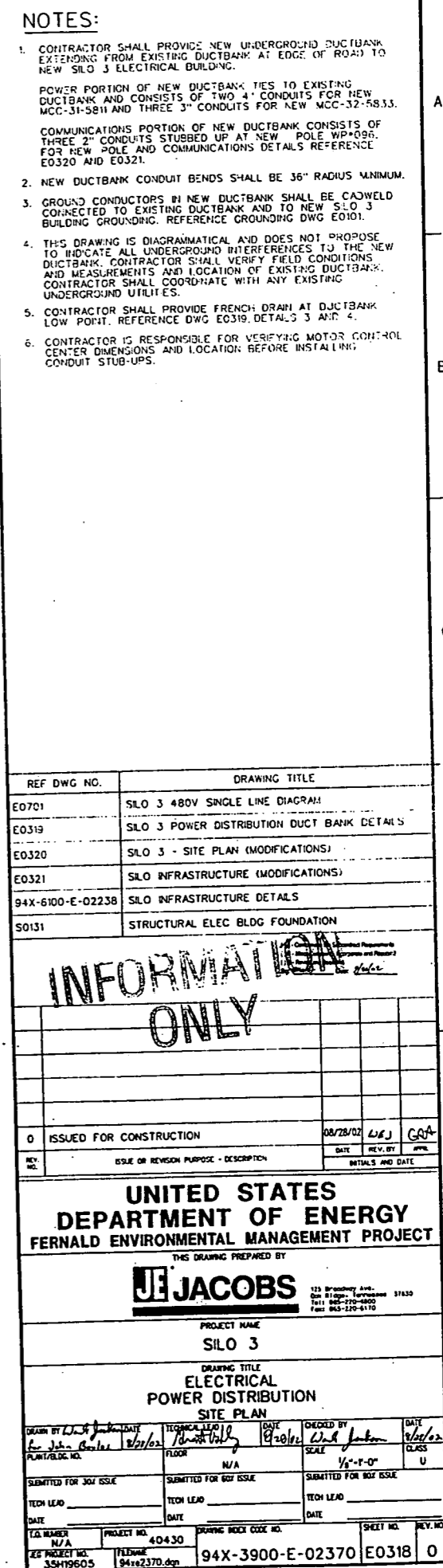
THIS DRAWING PREPARED BY  
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125 Broadway Ave.  
Oak Ridge, Tennessee 37830  
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Fax: 615-576-6110

PROJECT NAME  
SILO 3

DRAWING TITLE  
ELECTRICAL  
SITE PLAN  
MODIFICATIONS

DATE	08/28/02	DATE	08/28/02	DATE	08/28/02
TECH LEAD	NA	TECH LEAD	NA	TECH LEAD	NA
DATE	08/28/02	DATE	08/28/02	DATE	08/28/02
PROJECT NO.	40430	PROJECT NO.	40430	PROJECT NO.	40430
FILE NAME	94x2476.dgn	FILE NAME	94x2476.dgn	FILE NAME	94x2476.dgn
DRAWING INDEX CODE NO.	94X-3900-E-02476	DRAWING INDEX CODE NO.	94X-3900-E-02476	DRAWING INDEX CODE NO.	94X-3900-E-02476
SHEET NO.	E0320	SHEET NO.	E0320	SHEET NO.	E0320
REV. NO.	0	REV. NO.	0	REV. NO.	0



1. CONTRACTOR SHALL PROVIDE NEW UNDERGROUND DUCTBANK EXTENDING FROM EXISTING DUCTBANK AT EDGE OF ROAD TO NEW SLO 3 ELECTRICAL BUILDING.

POWER PORTION OF NEW DUCTBANK TIES TO EXISTING DUCTBANK AND CONSISTS OF TWO 4" CONDUITS FOR NEW MCC-31-581 AND THREE 3" CONDUITS FOR NEW MCC-32-583.3.

COMMUNICATIONS PORTION OF NEW DUCTBANK CONSISTS OF THREE 2" CONDUITS STUBBED UP AT NEW POLE WP-086. FOR NEW POLE AND COMMUNICATIONS DETAILS REFERENCE E0320 AND E0321.
2. NEW DUCTBANK CONDUIT BENDS SHALL BE 36" RADIUS MINIMUM.
3. GROUND CONDUCTORS IN NEW DUCTBANK SHALL BE CABLED CONNECTED TO EXISTING DUCTBANK AND TO NEW SLO 3 BUILDING GROUNDING. REFERENCE GROUNDING DWG E0101.
4. THIS DRAWING IS DIAGRAMMATICAL AND DOES NOT PROPOSE TO INDICATE ALL UNDERGROUND INTERFERENCES TO THE NEW DUCTBANK. CONTRACTOR SHALL VERIFY FIELD CONDITIONS AND MEASUREMENTS AND LOCATION OF EXISTING DUCTBANK. CONTRACTOR SHALL COORDINATE WITH ANY EXISTING UNDERGROUND UTILITIES.
5. CONTRACTOR SHALL PROVIDE FRENCH DRAIN AT DUCTBANK LOW POINT. REFERENCE DWG E0319, DETAILS 3 AND 4.
6. CONTRACTOR IS RESPONSIBLE FOR VERIFYING MOTOR CONTROL CENTER DIMENSIONS AND LOCATION BEFORE INSTALLING CONDUIT SUB-UPS.

REF DWG NO.	DRAWING TITLE
E0701	SLO 3 480V SINGLE LINE DIAGRAM
E0319	SLO 3 POWER DISTRIBUTION DUCT BANK DETAILS
E0320	SLO 3 - SITE PLAN (MODIFICATIONS)
E0321	SLO INFRASTRUCTURE (MODIFICATIONS)
94X-6100-E-02238	SLO INFRASTRUCTURE DETAILS
S0131	STRUCTURAL ELEC BLDG FOUNDATION

INFORMATION ONLY

0	ISSUED FOR CONSTRUCTION	08/28/02	WBJ	GAA
REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	DATE	REV. BY	APPR.
		INITIALS AND DATE		

**UNITED STATES  
DEPARTMENT OF ENERGY  
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

**JE JACOBS**

PROJECT NAME  
SILO 3

DRAWING TITLE  
ELECTRICAL  
POWER DISTRIBUTION

SITE PLAN				
DESIGNED BY <u>W.D. Johnston</u>	TECHNICAL LEAD <u>David Volz</u>	DATE <u>8-28-02</u>	CHECKED BY <u>W.D. Johnston</u>	DATE <u>9/5/02</u>
PLANTING DATE <u>8/21/02</u>	FLOOR		SCALE <u>1/8" = 1'-0"</u>	CLASS <u>U</u>
	N/A			
SUBMITTED FOR JOI ISSUE	SUBMITTED FOR BOI ISSUE			
TECH LEAD	TECH LEAD		TECH LEAD	
DATE	DATE		DATE	
TA NUMBER <u>N/A</u>	PROJECT NO. <u>40430</u>	DRAWING INDEX CODE NO.		SHEET NO. <u>E0318</u>
ISS PROJECT NO. <u>358H19605</u>	FILE NAME <u>94182370.dgn</u>	<b>94X-3900-E-02370</b>		REV. NO. <b>0</b>